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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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EDITORIAL NOTES.

Intemperate Criticism at Glasgow.

AN announcement that there will have to be an increase in the rates recently induced the "Glasgow Herald" to pen a temperate editorial article in which a plea was made for municipal economy. The immediate result has been a mass of intemperate correspondence in the local papers, the chief feature of which has been an attack on the management—"mismanagement" it is called—of the Gas and Electricity Departments. A more unfair time for making such an onslaught could not have been conceived, and that is the greatest weakness of the whole of the correspondence. It may be true that the Gas Department, as a result of the working during the past inglorious year for industrial labour, show a deficit in relation to financial liabilities of a million sterling; it may be equally true that the Electricity Department exhibit a deficit of £97,303 on their financial requirements. But these results are not necessarily a "glaring example of mismanagement." What the deficits disclose is that the consumers of gas and electricity last year were not called upon to pay sufficient for the service that was rendered them during the coal strike and subsequently, and during the great trade depression that prevailed partly as a result of the tactics of the Miners' Federation, supported by the Communist element in the country. While we can understand the ratepayers being somewhat incensed over a further increase in the rates, it is grossly unjust that a charge of mismanagement during such a year should be levelled against the two trading departments which are dependent upon coal for complying with their responsibilities in the service of the community. Particularly is this so in the case of the Gas Department. The critics appear to have no sense of honourable opportuneness for their criticism. To allege loosely that the concerns are grossly overstaffed, and are run with uneconomy and inefficiency, is to say the least scandalously slanderous when regard is had to record, and not to the results of a year which has no parallel in the history of municipal management. Mismanagement in such large enterprises is not the product of a single year; and the Glasgow gas undertaking can show, and did show until the lamentable labour and mining occurrences of last year, conditions of working and public service which stand in the front rank of good example in the gas industry. No amount of investigation would alter that fact. To say that other gas concerns do not from last year's trading show similar deficits merely evidences the fact that they raised their charges sufficiently to cover their extraordinary outgoings and financial obligations; it demonstrates nothing more than that—it has nothing to do with executive technical management. If there is any fault for not having raised charges sufficiently, it must be laid at the door of administrative policy. In the circumstances of Glasgow, it may have been an act of wisdom not to have imposed higher charges for gas than were levied during the year, but to liquidate the liability at a later date. While that is a matter on which there may well be differences of opinion, and while as a general policy we believe in such times immediately bearing their own burdens, we should not be prepared to express any dogmatic view on the subject as against the men who have at command local knowledge to assist them in framing policy. Regarding the correspondence which has appeared in the Glasgow papers on this subject, all we can say is that we have never read a mass of condemnatory opinion with a more complete absence at its base of the necessary knowledge to support it. We have no place for people who hide behind the hedge of anonymity and throw stones, and yet reveal an utter incompetence for producing justification of their act. We see that the Electricity Committee of the Corporation have appointed a Sub-Committee to inquire into the operations of their Department with a view to seeing whether, if any, economies can be effected consistent with maintaining the highest efficiency. We feel pretty confident as to the result.

A Survey of Changes in Ireland.

THERE is no more profitable exercise for any gas engineer and manager to-day than to bring developing conditions under close and serious survey, and to form conclusions as to how they will affect gas interests, what will be required of us in the circumstances, and how we may reinforce our position with the view of meeting the changes in environment. These matters have been the subject of review in various Presidential Addresses; but never until now from the Presidential Chair of the Irish Association of Gas Managers. Hence it is there is peculiar interest in reading the address of Mr. Joseph McNicholl, Engineer and Manager of the Cork Gas-Works, whose observation of current and prospective affairs, together with requirements, shows a penetration such as we have been wont to associate with Cork from the days of that sentient Engineer and Manager, and universal gas friend—Denny Lane.

Not too strongly can we urge attention to the President's examination of the electrical position in relation to the prospects of gas. The Irish gas industry in this respect is in like situation to the gas industry of England, Wales, and Scotland. The Government of the Irish Free State are materializing the Shannon electric power scheme; in this country, the Central Electricity Board and the Electricity Commissioners are busy on the Government scheme of centralizing electricity generation. If anything, the Irish gas industry should be in worse case than the gas industry of this country, inasmuch as what is being done is to produce electrical energy by water power, and thus save coal. Engineers will be extraordinarily interested in this demonstration of what can be done so near home with water power on a fairly large scale; but, as representing the competing gas interests, we have, with the President, little fear (with one reservation) that any harm will come to gas from even this water-power generated electricity. Optimism in this regard has its limits. It must not be shared by unprogressive gas undertakings; it is only for those who are progressive, who are taking thought for the morrow, and who are shaping policy with the view of defence and gaining new ground. At the best, water power or concentrated steam generation can only affect production costs; and, compared with local generation, the gain must be discounted

by transmission costs—capital and working. Transmission costs, too, must be influenced by the character of the country; and we have yet to learn that the nature of the demand in the sparsely populated areas of Ireland is not going to make the weight of distribution costs heavier than they will be in the worst of electricity consuming areas in England. We want to see Ireland progress by every means available—by electricity as well as by gas; but the extent to which it will do so by gas naturally depends very much upon the work of the suppliers in providing it cheaply, and in looking after its efficient utilization.

From the start, it has been perfectly obvious to us that the estimates of production costs under the Shannon scheme have been given the best of complexions by their authors; and we are at one with Mr. McNicholl in believing that, with the emerging of the project into practical working, the truth of this will be demonstrated. It is clear the President has been at pains to investigate the probabilities in respect of Cork; and there is a quiet confidence that the price at which delivery can be effected to that city is well over 1d. per unit, which allows nothing for local distribution and the ordinary working of the undertaking. Considered in relation to modern steam generation, upwards of 1d. per unit is not a low figure. But it is the one which has to be compared with the local generating cost, and it suggests that it will not be surprising if current can be supplied as cheaply as at present. It has been assumed that eventually the annual consumption from the Shannon scheme will reach 150 million units, which would mean the displacing of 135,000 tons of coal a year. There is interest here in comparison from the thermal point of view. As the President shows, 150 million units of electricity have only a calorific value of rather more than 5 million therms, while the annual gas output of the Cork Gas Company is not much short of 2 million therms, and that of the Dublin Gas Company is about 9 million therms. The Shannon scheme cannot therefore produce much fear so far as the interests of such progressive gas concerns go. To fill the heating and cooking rôle of gas, there is not the capacity in the Shannon to compete seriously. Where it would have most success is where gas shows the greatness weakness; and that is where negligent policy and practices prevail. While, from the gas aspect, there is satisfaction in the President's examination of the situation, there is also the danger which he recognizes and against which he gravely warns. It is that the result of the examination may cause those who are indolent and have little care for the future to continue to pursue their old ways. There has been abundant caution against this. Such concerns will, of course, provide for cheaper electricity the easiest paths to a success which it cannot hope to achieve where there is more enlightened management, and where the trend of activity is to cheapen gas as far as possible, and to ensure that the user of it obtains the maximum efficiency from it. The two things go together in the progress and maintenance of business in the impending new circumstances.

Cheap gas is the product of many factors—including capital, plant, process, management, secondary products, and so forth. The President is strong against doing anything to depreciate the value of coke, as, in his view as in ours, everything possible should be accomplished to realize for it a demand equal to that of coal. He is of opinion that much of the ash in coke is due not to the ash in combination in the coal substance, but to the foreign material mixed with the coal, which means that better cleaning at the pithead is an essential. He looks hopefully to the exploration which is being made to improve the physical structure of coke, to give it better qualities in respect of ignitibility and combustibility. We share the belief that, as the outcome of current work, the gas industry will eventually be able to provide a smokeless fuel which will be used in preference to coal. In fact, having regard to developments in other directions, we are confident the industry will have to make coke a first-rate commodity in defence of the price of gas, or, in time, it will mean a large measure of gasification. The President looks to tar to render further assistance in the reduction of the price of gas; but we must not overlook the possibilities of increased tar production from coke ovens and low-temperature plants unless more can be done by the gas industry to maintain its own coke market. Sulphate of ammonia does not encourage much hope of its being a substantial contributor to the reduction of gas prices. The President, however, does not, even in this regard, altogether abandon his optimistic views. However difficult it may seem at present, he has an idea that we shall not have to wait very long for a successful process for the direct combination of sulphur and ammonia. But he would like to see a less ambitious attempt than the Burkheiser to manufacture sulphate of ammonia by the direct combination of ammonia distilled from ammoniacal liquor with sulphur dioxide from spent oxide. He believes this would not be difficult if the ammonia were not associated with other gases; but the difficulty, in his view, is not insuperable. Emphasis is also laid by him on the importance of service to ensure the best utilization of gas. As we have often remarked, gas that is cheap *per se* may become dear to the consumer if it is improperly used.

Another point is the accentuation of the importance of the industrial load. The President is inclined to charge the makers of gas-engines with not having done all they might have done to help town gas to meet the growing competition for the power load. That is a matter with which the engine manufacturers can themselves deal. It is largely a question of the price of gas. As Sir Dugald Clerk showed in his Institution paper a few years ago, unless the gas industry can offer manufacturers gas at a price per therm which will compete over-all with electricity, suction gas, and oil, then the power business for town gas must remain at a somewhat restricted level. However, we think the engine manufacturers are alive to the fact that the gas industry is concentrating its efforts upon gas manufacturing economies and efficiencies, and tariffs, and that good effort is being made to bring about a better competitive situation in respect of power. In this connection, the President makes a suggestion. He considers the problem of the development of the internal combustion engine is one of the most important that confronts the gas industry to-day. Therefore, it should be the subject of research jointly by the Institution and the Society of British Gas Industries.

Cheap gas and good service in every department of a gas undertaking must be the policy in the circumstances of to-day, and in those new ones which are developing.

Is Publicity Necessary and Profitable.

THERE are many striking features in the paper that Mr. W. M. Mason, Manager of the British Commercial Gas Association, read during the recent meeting of the Irish Association. To us the most noticeable one is that there should be in these times any need for such a paper. "Is "Publicity Necessary and Profitable to the Welfare of "the Gas Industry?" is the title; and we are told by the author that there are men in the industry who say that publicity is neither necessary, nor is it profitable—that the reputation and merits of gas are sufficient. We are sorry to hear this. It is the negation, or rather attempted negation, of all the experience of our foremost industrialists and traders; it is a denial of the demonstrable truth that during the sixteen years' life of the "B.C.G.A."—despite war, trade depression, coal and other strikes, and keener competition—the gas industry has made more progress than ever before in a similar period. Those have been the years of greatest publicity and propaganda activity in the industry; and the expansion in our business girth is due to that activity, and not alone to merit. We know a firm of very high standing in the industry who many years ago discontinued advertising its goods in the "JOURNAL." The competitors of the firm did not discontinue their publicity in our columns. The lapse of their rival was the best opportunity they had ever had. Two or three years later, the firm—it is still in existence—wrote to us asking for our advertising terms; and, in doing so, they frankly stated that, during the period their announcements had not appeared in our pages, their business had been slowly dwindling until they considered, in their own interests, it was wise to re-establish their position by publicity. We do not men-

tion that fact in the interests of the "JOURNAL," but in the interests of general trade publicity. What is true of that firm is true of other businesses—is true of gas, electricity, and oil. There is an injunction of ancient birth which bids us let our light so shine that men may see our good works; and there is a well-known saying regarding the folly of hiding one's light under a bushel. Both pieces of philosophy have received the endorsement of ages. There is one thing which strikes us about those gas men who think that publicity is neither necessary nor profitable; and it is that they are consistent. They do not give much publicity to their views as to why it is not one or the other. The contributions we have had on the subject have all been on the affirmative side—on the side of the need and profitableness of publicity. We therefore invite signed contributions to our columns in defence of the negative side of the question. The only fear we have is that, after reading Mr. Mason's paper, there will not be a great response. We should much like to hear the other side, and to discuss it.

"Household" Ammonia.

THE position of sulphate of ammonia has become very acute. Prices are comparatively low having regard to the costs of production; and for many works, even the larger ones, the problem is how to reduce those costs, or how to make more profitable use of at any rate part of the ammonia. There is, however, little chance of manufacturing costs being reduced while sulphuric acid declines to render better assistance in the circumstances. Hence it is that Dr. Carpenter, at the last meeting of the South Metropolitan Gas Company, indicated the necessity for investigation on their part to ascertain how practices could be revised in order to make their ammonia more profitable. This aspect of the subject was raised in the paper which Mr. G. Walmsley, of Londonderry, read at last week's meeting of the Irish Association, and in which he advocated the manufacture of liquid "Household" ammonia as an adjunct to sulphate of ammonia production. Though it will not alter the situation, it must not be overlooked that the more the carbonizing industries recede from sulphate of ammonia production, the better it will be for the synthetic ammonia producers. It must also be borne in mind that it is not gas undertakings alone which are concerned in this matter, but that all bye-product carbonization is interested; and therefore no one specific, with about 36 million tons of coal involved, can do much to alter the position. We have also a great deal yet to learn about the costs of making synthetic ammonia, and as to the limit of the unit of production at which increasing bulk ceases to effect a lessening of that cost. Not until we have definite information on that score shall we be in a position to know to what manufacturing cost it will be necessary for bye-product ammonia to be reduced in order to make its commercial position effective in regard to the synthetic competition. At present, however, the outlook is not very hopeful, when we hear of plans for the extension of synthetic plants which will multiply the output of sulphate of ammonia many times, even though prices are already low owing to the supply of nitrogenous fertilizers being greatly in excess of the world's present absorption.

However, gas undertakings have to look after themselves in this matter, and while it is yet early to formulate any universal policy, it is clear that it is a duty to see whether or not it is possible to develop local trade in a new direction which will afford some profitable relief in respect of the ammonia available from the carbonization of coal. Mr. Walmsley's proposal is, as already indicated, the conversion of some of the sulphate ordinarily produced into liquid "Household" ammonia of about 10 p.ct. to 12 p.ct. strength; alternatively, attention should be given to some such scheme as the production and sale of concentrated ·880 ammonia in bulk. The addition to capital expenditure for the former is small compared with that for the latter, and that is a recommendation. There is, as Mr. Walmsley admits, nothing new about these suggestions. Regarding the production of liquid "Household" ammonia, he supplies a financial balance-sheet, based on a ton of sulphate of ammonia, which takes into account every item excepting the one necessary for establishing and advertising the new business. The balance of profit shown makes one's mouth water compared with that realizable to-day per ton of sulphate. But the great thing is to ascertain exactly what can be done in instituting a demand for the product, as until this is done—until people are educated as to the value of the commodity which gas undertakings can offer—it is impossible to know the extent to which to go in this direction or whether it would be worth while. Mr. Walmsley himself confesses to disappointment in respect of the demand, though he has not yet tried all the ways of development which he recommends. However, his paper (which was published in the "JOURNAL" last week) is worth close study as an excellent and concise submission of the case for a development on the lines indicated.

Manchester Tar Prices.

For a long time past, we have been publishing tar prices from the Manchester district which represent the average values of the constituents of the tar from various undertakings. But the publication of the monthly figures has been very erratic, due generally to disagreement on the part of contributory undertakings over actual values. Even in August we have not the prices for April; and this is owing to such disagreement. It is known that on these prices certain contracts are based. Such belated figures, however, can be of little use to those concerned in the contracts; and we have often suggested that those who base contracts on these prices take, of course, an inadvisable risk. We learn that there is now a likelihood in the near future of these Manchester prices not being available. In view of this, those gas or coke-oven undertakings and dealers who have been relying upon them had better take the hint, and make other arrangements.

Gas-Works Effluents.

The leaderette under this heading in our issue for the 10th inst. has brought to us the information that Messrs. Robinson Bros., Ltd., of Exchange Buildings, Birmingham, have recently developed a process (which has passed the laboratory stage) by which any gas-works effluent of which the firm have been able to obtain a sample can be rendered practically innocuous, with the total elimination of such tar acids as are present, and the recovery of a very high percentage of these in saleable form. The process is patented. We have not the slightest doubt that Messrs. Robinson will be pleased to afford facilities for an investigation of the process by anyone interested.

Gas Consumers and Electricity Losses.

One of the most iniquitous pieces of legislation ever placed on the Statute Book is the Electric Lighting (Scotland) Act, 1890, which makes possible, across the Border, the payment of losses incurred by electricity departments from the profits made from gas consumers, when the two undertakings are under the jurisdiction of the local authority. In Alloa, the gas undertaking is compelled to maintain the price of gas nearly 38 p.ct. above what would be necessary in order gradually to liquidate the losses which have been accumulated by the Electricity Department, which, with the deficit last year of £8600, now amount to no less than £42,403. We have nothing but contempt for a condition of affairs which amounts to sheer robbery of the gas consumers, and which is a drag upon the progress of the undertaking in service to the community. The matter is again revived by the estimates which Mr. J. W. Napier, the Gas Engineer and Manager, has submitted to his Committee, and which show a computed net profit for the current year of £10,700. Were it not for the pilfering of the gas consumers, that profit would allow the present charge of 4s. 3d. per 1000 c.ft. to be reduced by no less than 1s. 2d. to 3s. 1d. This is a scandalous position. We should imagine the gas consumers were glad when the Council decided to sell their electricity works to the Scottish Central Power Company. They will also be pleased if the Council resolve to obtain power to impose a general tax on the ratepayers, in order to assist in liquidating the huge deficit. The National Gas Council are proposing to include in their scheme of legislation a clause to

abrogate the 1890 Act referred to in the opening lines; but, of course, this could not be made to operate retrospectively. However, the gas consumers of Alloa are at the beginning of the end of, for them, a dismal position.

Men Who Strike Most.

Some remarkable figures were quoted at a recent session of the Welsh Liberal Summer School at Llandrindod Wells, when the subject of "The Workers' Place in Industry" was introduced by Mr. Ramsay Muir. The statistics related to strikes in the last 24 years. In the first eight years, Mr. Muir said, the average number of working days lost each year through strikes and lock-outs was 4,300,000; and, taking 10s. as an average day's pay, there was a loss to the men involved of £2,000,000 a year. In the second period, the days lost numbered 11,200,000 and wages £5,500,000; while since the war, in the third period, 44,000,000 days were lost and £22,000,000 in wages. In the 21 years before the war, 186,000,000 days were lost, of which 104,000,000 were in the coal industry, or 50 p.ct.; while in the eight years since the war, 243,000,000 days had been lost in the industry, or 62 p.ct. The coal industry lay at the very root of our national prosperity, and if it cannot be got into order, the outlook is indeed grim. The miners, with the transport workers, making 5½ p.ct. of the working population, account for 75 p.ct. of the industrial stoppages. The only way in which peace can be secured is through efficiency on the one hand, and justice on the other.

Better Employment.

It is reported that the number of persons on the registers of the Employment Exchanges on Aug. 8 was 1,024,700. This was a reduction of 95,128 on the week before, and 569,469 less than in the corresponding week of last year, when the figures were affected by the dispute in the coal-mining industry. Of the 1,024,700, 669,600 were wholly unemployed, 294,000 temporarily unemployed, and 61,100 were persons normally in casual employment.

PERSONAL.

We understand that Mr. H. Talbot, M.I.Chem.E., B.Sc., A.R.C.Sc., General Manager of the Welsbach Light Company, Ltd., has been appointed a delegate of the Society of British Gas Industries to the forthcoming Industrial Commission on Illumination, the meetings of which are being held in Bellagio from Aug. 31 to Sept. 3. Among his many other activities, Mr. Talbot for some years, and until recently, filled the office of Hon. Sec. of the Chemical Engineering Group of the Society of Chemical Industry, and was a Joint Hon. Secretary of the newly-formed Fuel Section of the Society.

OBITUARY.

A wide circle of friends in the gas industry, and in the public and private life of Norwich, will grieve to learn of the sudden death on Aug. 17 at the Kingsley Hotel, London, of Mrs. Thomas Glover, wife of the Engineer and Manager of the British Gas Light Company's undertaking at Norwich, and Ex-Lady Mayoress of that city. We sincerely join in the heartfelt sympathy which will go to our almost lifelong friend and to the family. For a great number of years, it had been the pleasure of many in the gas industry to see Mrs. Glover at the Annual Meeting of the Institution and elsewhere, and to enjoy her hospitality at Norwich. Particularly will be remembered the year 1909, when Mr. Glover was President of the Institution, and Mrs. Glover participated in the reception of the members. To all she endeared herself by her charming and affectionate nature. Mr. Thomas Glover's sudden bereavement is rendered the more poignant by the fact that he and Mrs. Glover were *en route* to join the Blue Star liner *Avila*, sailing from Tilbury on Wednesday, which was to take them on a visit to their son who is with the Primitiva Gas Company of Buenos Aires. On Tuesday evening Mrs. Glover was eagerly anticipating the voyage, and was apparently enjoying her usual health; but on the following morning, when preparing to leave the hotel, she collapsed suddenly and died at 10 a.m. Mrs. Glover was a daughter of the late Mr. Christopher Sharples, J.P., of St. Helens, and sister to Mrs. Samuel Glover. During her 25 years' residence in Norwich she was actively engaged in social work, especially during her term of office as Lady Mayoress. The funeral took place last Saturday at St. Helens.

ELECTRICITY SUPPLY MEMORANDA.

Among the amusing experiences we have in following our electrical friends in their commercial activities are the tortuous expedients they adopt in the effort to prove that electricity is a cheap agent for domestic purposes. It is a difficult task; hence the curious means and expressions to which there is recourse in making the essay. The "Electrician" adds to our entertainment in this regard. It says: "At the risk of boring some of our readers, we have been at some pains to bring home to all electrical people a realization of the great truth that electricity, whatever it costs in actual cash, is cheap when the value of the services which it alone can render are taken into account. This point of view is one that comes in a strange atmosphere of novelty to many; and we feel while this is so further reiteration will be all to the good." Let us examine this lovely concoction of words. Our contemporary confesses that it has been "at some pains" to do this, which attests the difficulty; and what it has done has needed "further reiteration." "All electrical people" indicates the wonderful mass of unbelief respecting the "great truth" that exists in the industry, and which our contemporary seeks to correct. It is not a "great" truth, nor a little one—in fact, it is not a truth at all when applied to heating; and electricians know it. There is also a little word-spinning in the expression "a strange atmosphere of novelty," seeing that "novelty" is usually "strange."

The "Cheapness" of Electricity.

The "Electrician" has come across some statistics prepared by the "N.E.L.A." Rate Research Committee, of New York, which, it is believed, show how small an item electricity is in the family budget. The figures declare that, based upon actual selling prices in 142 cities of over 50,000 population, two independent organizations have arrived at a percentage of 5·65 for fuel and light on the total family budget for the year, and electricity alone accounts for 0·63 p.ct. of the total expenditure. The bare statement is as luminous as a lump of coal without the application of heat. In the first place, it looks as though the 0·63 p.ct. is for lighting only, seeing that there is 5·02 p.ct. remaining, which is apparently for real fuel, and not for something that is a pretence. In the next place, a percentage of the kind is a snare and a delusion, seeing that, based upon total domestic expenditure, it would differ considerably for the millionaire and the labourer. If domestic expenditure has been averaged to obtain the basis for calculation, then the resulting percentage can apply to no one. In short, no single item of domestic expenditure can be genuinely valued in relation to the total. In the case of heat and light, comparison, to be of value to the consumer, must be relative to other agents for performing the same operations, and for doing an equal amount of work. To take any other basis is silly, and shows a weakness.

The Percentage Basis.

It seems to be the fashion nowadays—and it is a very good one—for engineers to visit different countries to ascertain what their compeers are doing in the matter of progress. We are not the only travellers in quest of information; engineers from other countries visit us, and they gain from their journeyings as we do from ours. Several electrical engineers have been to the United States; mention has been occasionally made of the results in the "Memoranda." It has been shown that some of the stories of remarkable differences between the United States and this country which helped to bolster up the Government electricity scheme were highly coloured and inflated. Mr. John Christie, the Electrical Engineer and Manager of the Brighton Corporation Electricity Works, has been to America. He finds that there they are far ahead of us in the design, lay-out, and organization of their boiler-houses. Pulverized fuel appears to be the almost universal practice in the modern plants; and this supports the adoption of it in the extensions of the Southwick (Brighton) plant. Mr. Christie has a right to think that his boilers, though comparatively small in size, are a distinct advance on the best he saw on the other side. Where the Americans score is that they seem to have plenty of money at their disposal; and the construction of their stations, the buildings, and their general finish are undoubtedly better on the average than similar structures in this country. Turbine plants are now being built in gigantic units up to 100,000 kw. and over; but, except for size, Mr. Christie does not regard them as being in any way superior to our best modern British practice. The newest and largest power plants are worked as base stations; and in this way get very high load factors (80 p.ct. and over), which tend to economical operation. Mr. Christie says he is

Technical Position in America.

sure, if the best English plants now running or being constructed were operated under similar conditions, we could equal, if not surpass, them in results. We admire Mr. Christie's appreciation of the æsthetic. He finds the overhead transmission lines for extra high-pressure are really things of beauty, and in no way mar the appearance of the landscape. Of course, what an engineer regards as things of beauty are not always so to other men.

Street Lighting and Domestic Service.

As to street lighting, except in some of the principal avenues of the larger cities (where very intensive lighting is used), Mr. Christie saw little that was any great improvement on the best to be seen in London and the leading provincial cities. What apparently happens is that in America more money is spent, and higher candle units are applied than is usual here. Mr. Christie says that if we had the same funds at our disposal, we could easily equal or surpass our American friends as regards intensity of illumination, and give better value for the same expenditure. But we would remind Mr. Christie that intensity of illumination does not always represent quality of illumination. The visitor was struck by the wonderfully equipped showrooms run by the public utility companies (gas and electricity are often supplied by the one company) in conjunction with their offices for collecting accounts; and he feels sure, if such a course were adopted here, and worked in co-operation with the local contractors, it would greatly help to develop the domestic load—to mutual advantage. Another surprise was the relatively high prices paid for the electricity service by the average domestic consumer in American cities. The ordinary rates range from 15 to 10 c. per unit for lighting and 5 c. for power. These rates compare by no means favourably with the very reasonable charges in Brighton—4½d. per unit as a maximum for lighting, and 1d. for power. Yet in America the energy is generated by large and more efficient units of plant, operating at infinitely higher load factors than in Brighton, while the calorific power of the coal used is also somewhat higher, though the price paid per ton is generally less.

Those Meat Juices Again.

Burnaby Mayfield may be an excellent observer of the ways of women visitors to showrooms, and of the wonderful instinct they disclose in pointing out the defects for which men are responsible in the design of electrical appliances. Judging from the amount of criticism we have read from time to time of electricity-using equipment, the intelligence of the ladies would not be of a very high order if they were unable to place their fingers upon some weaknesses in finish or design. But Burnaby Mayfield is not a good guide on the subject of the retention of the juices of meat in cooking. In an article in the "Electrician," he states that, in nearly all pamphlets on electric cooking, stress is rightly laid upon the retention of natural juices in the meat, resulting in less diminution in weight after cooking. "But the best way to the woman's mind would seem to be to point out that these natural juices are not, as with gas, sent out into the dripping—in other words, you do not melt down expensive meat into cheap dripping, leaving the fibrous portions of the joint which are the least succulent and toothsome to be served up." We wonder whether this new "authority" on this subject has ever chemically tested what he is talking about. If he has, something has gone wrong with his experiment. But we would not mind asserting that he has never made scientific investigation of the subject to support what he has loosely declared in the quoted words. In the first place, exposing meat to equal temperatures, what physical difference is there in the heat of gas and that of electricity which should make a difference in the meat results after cooking? We hope Burnaby Mayfield will answer that simple question; and then there will be one less electrical educator of the public who will be prepared again to make himself look foolish. Whether gas or electricity be used, there are the most suitable temperatures for realizing the best results; and with both agents too high or too low temperatures can be obtained. In cooking meat, the fibres are loosened by the gelatinization of connective tissues, some fat is eliminated, and there is a decrease in the water content, with a corresponding increase in the nutritive value. The net loss suffered by meat in cooking is a result of both its nature and the temperatures employed—the proteins, fats, and carbohydrates are all affected by the action of heat.

The Duke's Meadow Scheme.

The Bill promoted by the London and Home Counties Electricity Authority, under which it is proposed to erect a large power station at Chiswick, has been noticed on previous occasions, owing to the site being the one on which the late Brentford Gas Company sought to construct new works. The House of Lords has consented to the land being used for a power station, subject to a clause being inserted that the Electricity Commissioners must come to a decision within five years as to whether the station would be adopted by them as a "selected" one for the purpose of the Government scheme. The Chief Electricity Commissioner (Sir John Snell) stated that, as an individual, he would first build the Battersea station of the London Electric Power Company, and follow up with the Chiswick station, which, in his view, will not be required for two or three years. A clause was inserted in the Bill limiting the power of the promoters to use the Thames for carrying coal to the works by barge. Cooling towers are not to be erected at Chiswick.

Mishaps.

On Aug. 10 Archibald Hay, of Edinburgh, employed by the North British Rubber Company, was working on the roof of a boiler-house with an electric drill. Some time later he was found dead, having presumably been electrocuted. Charles Locke, a crane driver, recently received a fatal shock at the works of Samuel Fox & Sons, Ltd., of Stocksbridge. His face came into contact with a live trolley wire, which was charged with 500-volt direct current. On Aug. 9, an inquest was held at Kilburn on Victor Richard Brooker (17), whose death was caused by a faulty switch in a garage at Cricklewood. Lancaster and Selby have recently had failures of their electricity supply—in the latter case for thirty hours, owing to a defect in the cable transmitting current between Goole and Selby. Last Thursday, the tramways in Liverpool were held up for half-an-hour owing to a breakdown at the power house. The Bristol papers on Aug. 10 report a fire at the residence of Sir E. B. James, at Stoke Bishop, through an electric iron becoming overheated. Fortunately it was discovered in time to confine the damage to the contents of a single room. An explosion occurred in Leadenhall Street, E.C., on Aug. 9. The two lids of an electric-light box in the pavement were thrown some feet into the air; and dense volumes of smoke and flames issued from the box.

GAS SALESMEN'S DAY.

Programme of Arrangements for the Meeting.

The following is the programme of the Fifth Annual Meeting of members of Gas Salesmen's Circles, which will be held in the Caxton Hall, Westminster, S.W 1, on Friday, Sept 16:

MORNING.

10 15 a.m.—Assembly of members.
10 30 a.m.—Welcome by the Executive Chairman: Mr. F. W. Goodenough.
Brief statements by Chairmen on the work of the Circles in various districts.
Address by Mr. H. Ernest Hunt on "An Unconventional View of Business."
Discussion on Address.
12.30 p.m.—Adjournment for lunch.

AFTERNOON.

1.30 p.m.—Re-assemble at Caxton Hall, for conveyance by chars-a-bancs to visits arranged through the courtesy of the Governor and Board of the Gas Light and Coke Company.
2. 0 p.m.—Meter and Stove Shops, Fulham.
Methods of handling meters and stoves from entry to works to dispatch to district; sounding and adjustment of meters; oil and paint spraying and washing-off rooms; new banks for the loading and unloading of stoves; copper house; gas muffles (with moving trolleys) for "burning-off," and sand blasting plant; re-assembling of stoves; japanning rooms, spray enamelling; material stores.
3.15 p.m.—Watson House, Nine Elms.
Fitters' and apprentices' technical and training sections; testing and demonstration rooms; chemical and research laboratories; analysis, examination, and testing of appliances and materials.
4.30 p.m.—Afternoon tea (kindly provided by the Gas Light and Coke Company).

VISITS TO SHOWROOMS AND OFFICES.

At the conclusion of the visit to Watson House, members are invited to inspect any of the more recently opened of the Gas Light and Coke Company's showrooms, as follows: Walham Green, Fulham; Church Street, Kensington; and High Road, Kilburn. [Information as to the best means of getting to these showrooms can be obtained from the Secretary of the "B.C.G.A."]

LUNCHEON.

It is not possible to make prior arrangements for lunch; but the following is a list of recommended restaurants within easy reach of the Caxton Hall:

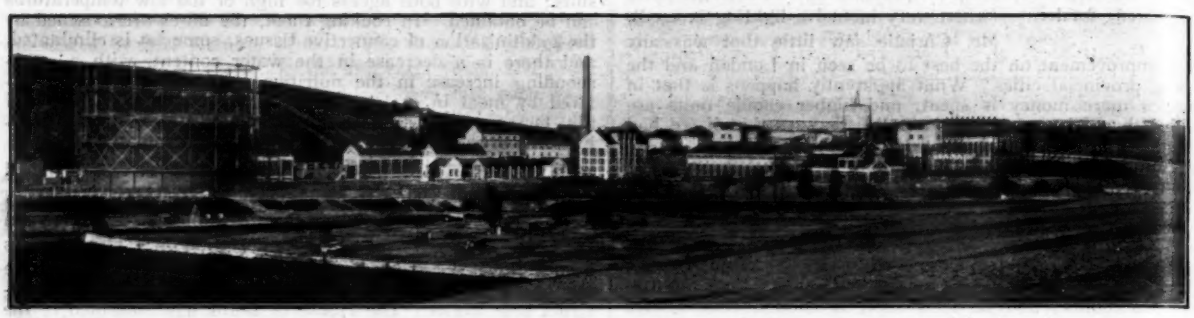
Cabins Restaurant (adjoining Central Hall), Tothill Street, Westminster.
Hill's Restaurant, Buckingham Gate, Victoria Street.
Victoria Mansions Restaurant, 24, Victoria Street.
Stewart's Restaurant, Victoria Station (District Railway).
Victoria Station Restaurant, South Eastern Section, Southern Railway.

TRAVELLING FACILITIES.

It has not been possible to arrange specially reduced railway fares for the meeting; but members are reminded to ascertain locally facilities with regard to excursion and party rates.

THE NEW MICHLE GAS-WORKS AT PRAGUE.

Singular interest attaches to this descriptive article, because the entire works were contemplated, designed, and constructed *en bloc*. Those responsible desired that the new works should not only be efficient from a purely engineering point of view, but possess æsthetic value, which has a beneficial psychological effect on both employers and employed. The result of their endeavours is unique—as will be understood from the article and the illustrations which accompany it.



A GENERAL PANORAMIC VIEW OF THE WORKS.

It is probable that few public men in the gas industry to-day have had the pleasant and interesting experience which has been the lot of Mr. F. Titera, the energetic President of the Municipal Gas Committee of Prague, the capital city of the Republic of Czechoslovakia. In 1922, as Vice-President of the Gas Committee and member of the Municipal Finance Commission, he took part in negotiations in London which culminated in the granting of an English loan to the City of Prague to the extent of three million pounds. Later, as President of the Gas Committee, he supervised the expenditure of part of this loan on the building of a complete new gas-works; and in May of this year, at a public function attended by the Ambassadors of Great Britain and France, he had the privilege of formally taking over the completed gas-works from the contractors, and of requesting the Mayor and Council to regard them as the most valuable possession of the Municipality.

An Example of Progress.

Czechoslovakia, as most people are aware, became a republic in 1918, following the break-up of the Austro-Hungarian Empire of which it had previously formed a part. Since that time the City of Prague (certainly one of the oldest and most interesting cities of Europe) has gone forward by leaps and bounds—new drainage systems, new electricity and water works, universities, and last but not least a complete new gas-works of the most modern type. The population has grown from roughly half-a-million at the beginning of the world war to its present total, which approaches 800,000.

Sale of Gas Steadily Increasing.

The present annual consumption of gas in Prague is approximately 1000 million c.ft., one-fifth of which is supplied by a gas-works operated by the Imperial Continental Gas Association. It is seen, therefore, that the annual consumption per head of population is approximately 1250 c.ft., which is, of course, extremely low in comparison with the corresponding figure for the average large city in Great Britain. In this connection it should not be forgotten, however, that the furtherance of the sale of gas is greatly hampered by the presence of abundant quantities of easily-won brown coal in the country. Brown coal, as most visitors to South Germany and Central Europe are aware, is very cheap in comparison with the black coal; and for decades past the heating-stoves and kitchens of the working and middle classes have been designed almost exclusively for the use of this cheap fuel. Thanks to energetic and judicious propaganda, however, all classes are beginning to realize the value of gas, particularly from the labour-saving point of view; and the sale of gas is steadily increasing. There can be little doubt that, before many years are gone, most of the brown coal itself will find its way to the gas-works for conversion into that best of smokeless fuels—gas.

Up to the end of last year Prague had received its gas from three municipal gas-works, situated in the suburbs of Smíchov, Zizkov, and Holesovice, which dated back to the years 1857, 1866, and 1887 respectively. It will be seen, therefore, that the gas industry in Prague is by no means new.

Modernization.

So far back as 1908 it was realized that the renovation or modernization of any of the three existing gas-works could be regarded as at best a doubtful temporary measure; and in 1912 a site was purchased in the south-east of the city, in the suburb Michle, for a new central gas-works which should eventually absorb the three then existent ones. In the same year schemes and projects were commenced for the building of this new works; but the world war intervened, and the matter had perforce to await the return of peace.

In 1921 the situation was becoming acute. On the one hand the existing gas-works had fallen into a state of disrepair, and on the other hand Prague had become a capital city and was in a state of rapid growth. In 1921, therefore, the earlier pre-war projects were abandoned, and international firms of repute in the gas industry were invited to submit schemes for a complete gas-works of the most modern type. Many and various projects were considered. Carbonizing and other plants of every conceivable type in England, France, and Germany were visited and studied by a commission of experts; and finally, in January, 1925, a contract for the construction of the gas-works was passed to the Compagnie pour la Fabrication de Compteurs et Matériel d'Usines à Gaz, of Montrouge.

The Vitkovic Ironworks were entrusted at the same time with the building of the gasholder, and the Municipality decided to carry out itself the laying of a new range of high-pressure distribution mains in the city.

The schemes finally accepted were based on a normal maximum production of 100,000 cub.m. (3,531,000 c.ft.) of gas per 24 hours, with the addition of a 36 p.ct. reserve to the carbonizing plant for peak loads, repairs, and scurfing; but the whole of the plant was to be arranged in such a manner that the capacity of the gas-works could be increased to 300,000 cub.m. per day (10,594,000 c.ft.) simply by adding the necessary new units alongside the plants first installed.

The Municipality decided eventually to construct the buildings for general service—such as the main offices, canteen, workshops, garages, dwelling-houses, &c.—itself, and to entrust the industrial buildings for the housing of plant to the contractors. Two years were allowed, under severe penalties, for the construction and putting of the gas-works into operation; and very definite guarantees had to be given for the performance of each unit of the plant.

Reconstruction Work Commenced.

The first excavation was commenced at a public ceremony in April, 1925, and gas-making began twenty-one months later, in December, 1926. When one considers that the site, at the commencement of operations, was merely a large, sloping field about 4 kilometres from the centre of the city, that not less than 160,000 cub. yards of earth had to be moved during the process of levelling the site, and that the work had to be planned to minimize the delays caused by the severe winters usually experienced in Czechoslovakia, one realizes the speed at which the contractors had to proceed to finish the works in the comparatively short time allowed. That they actually finished three months prior to the date fixed, represents a considerable achievement.

In this connection just tribute should be paid to the loyal co-operation of the local firms who delivered the bulk of the necessary materials to the designs and programmes of the main contractors. Chief among these are Messrs. Novak & Jahn, the Skoda-Works, Ceskomoravská-Kolben, and Breitfeld-Danek for machinery and steel and iron work, and the West Bohemian Chamotte Company for refractory materials.

General Lay-Out of New Works.

The general lay-out of the new gas-works is shown by the accompanying plan. The total ground area is approximately 20 hectares (about 50 acres), about three-quarters of which is occupied by the plant now working.

As will be seen from the plan, the various industrial houses are arranged in parallel lines from the retort house at the east-end of the site to the gasholder which occupies the extreme

western corner. The north boundary of the works, along the Havlicek Road, is formed by a wall of massive but pleasing design in concrete inset with iron grilles. This wall is broken only by the main entrance for road vehicles and the porter's lodge (23 in plan). The western half of the north boundary is backed by the houses of the Director, his Assistants, the Chief Chemist, and the foremen; each house being surrounded by a pleasant stretch of garden. Sites have already been allocated on the works for the houses and flats of the workmen and their families, so that the gas-works will eventually embody a complete small colony of the people employed.

For the transport of coal and coke, &c., to and from the works, a complete system of standard-gauge sidings has been laid from the main-line railway which passes the western corner of the works. These sidings diverge into two lines running parallel to the coal and coke stores respectively, and come together again to form a junction at the extreme eastern boundary. A short branch line has been provided, from the main coke siding, to pass into a well-equipped locomotive shed (16).

Carbonizing Plant.

The carbonizing plant consists of an installation of continuously-operated vertical retorts of the well-known Glover-West type, including all the recent improvements. There is one battery; and it comprises ten settings, each containing 8 retorts arranged in groups of 4, making a total of 80 retorts in all. The retorts are of the 40-in. "New Model"—that is to say, they are of elliptical cross-section at the top, having a major axis 40 in. long. Each retort is completed at the bottom by the Glover-West "steaming" chamber, which is specially constructed to facilitate the continuous production of water-gas in the retort itself by exposing a large surface area of the residual hot coke to the action of the incoming steam, thus raising the temperature of the latter to that of dissociation, without deducting from the heat required for dry distillation in the retort proper. The outgoing coke, having given up the majority of its heat to the steam, is discharged in a cool condition and does not require any further quenching. The retorts are arranged in four ranks, and are heated in horizontal combustion chambers arranged in tiers, one above the other. Each individual combustion chamber is provided with its own separate controls for the admission of producer gas and secondary air, so that the carbonizing temperature can be distributed at will over the full length of the retorts to suit the characteristics of the particular coal being carbonized. The secondary air necessary for the combustion of the producer gas rises in a vertical channel in the back wall of the setting, recovering heat from the waste gases and insulating the settings. It is then admitted to the combustion chambers at two separate points in the length of each chamber, thus grading the combustion into two parts and ensuring that the settings are heated evenly throughout. Above the combustion chambers is a number of circulating chambers in which heat is transferred from the waste gases to the incoming coal before the gases pass to the waste-heat recovery system.

Flexibility and Exact Control.

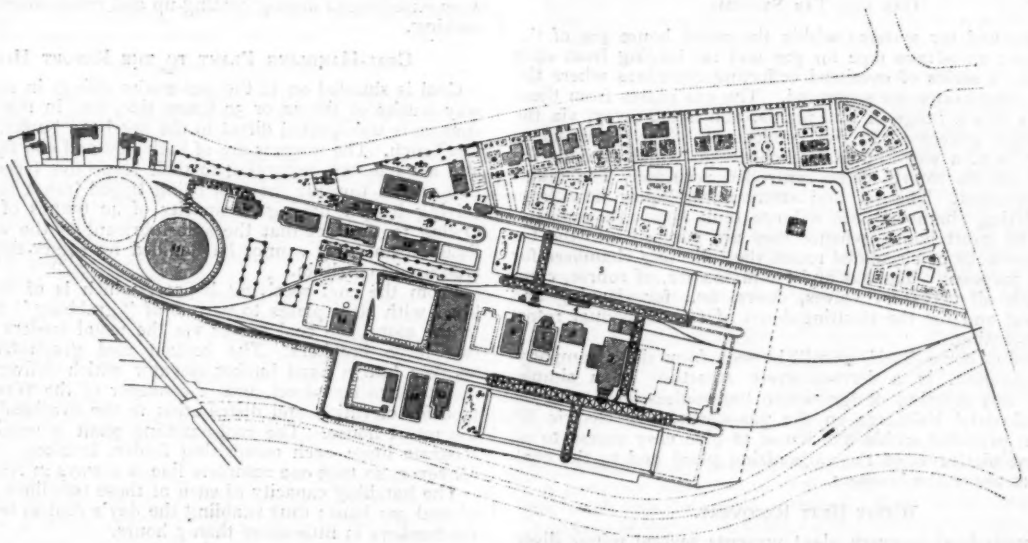
The marked flexibility and exact control which are given by this system of heating formed two of the preponderant features which originally attracted the Prague experts to the choice of this carbonizing system; and if one may judge by the ease with which several classes of coal have already been carbonized, giving excellent results, the confidence of the Prague experts was not misplaced. (The decision to instal Glover-West retorts at Prague, it will be remembered, fell close upon a similar decision in the neighbouring township of Plzen (Pilsen), where the plant has now been operating for two years to the entire satisfaction of the people concerned.)

The producer gas for the heating of the settings is provided by a series of individual producers which form an integral part of the retort bench; one producer being provided to each setting of eight retorts. These producers were something of an innovation to continental practice. In the first place, there are no doors to the grates; the admission of primary air being controlled entirely by the main dampers of the settings. Secondly, the grate area of each producer is about twice as large as that of the ordinary grate; and this ensures, especially when taken in conjunction with the fact that the producer-gas uptakes are worked under pressure, that the primary air travels slowly and steadily through the fire-zone without intermittent blasts or rushes, so that the temperature of the fire rises very little above that required for the gas reaction, and only the minimum amount of slag is formed. The producer is also constructed so that the shortest path for the primary air lies between the lower half of the grate and the producer-gas outlet. This eliminates short circuiting, and ensures that any slag which is formed will coalesce at the bottom of the grate, where it is easy to remove, and will not cling to the lintels and walls, whence its removal often leads to discomfort and damage. In fact, it has already been established in Prague that the driving of false firebars, hitherto considered an evil but necessary operation in the cleaning of the producers, is now entirely unnecessary. The producers are fed with unscreened coke from the retorts, a ferro-concrete coke-storage bunker and an overhead monorail having been provided for this purpose.

Working Capacity of the Plant.

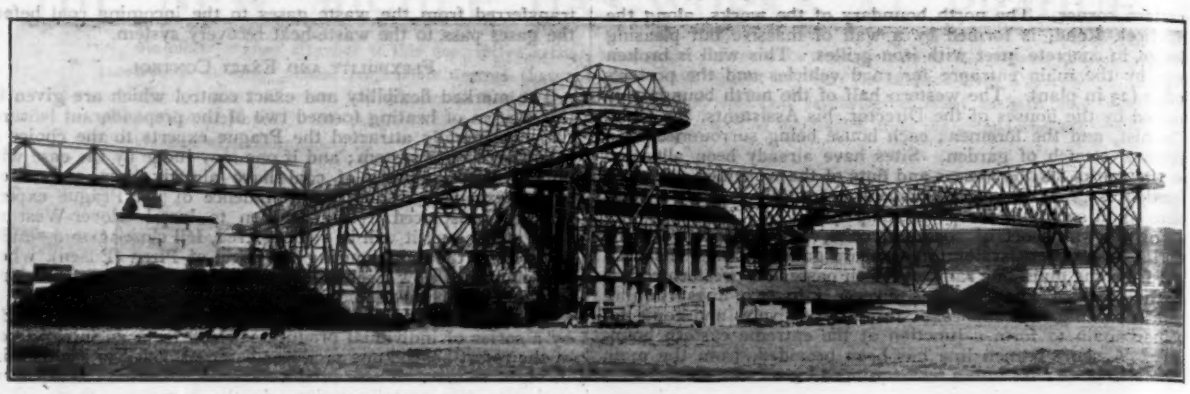
Working on a fat gas coal from the Ostrava coalfield, the capacity of the plant is based on a nominal average throughput of 4 tonnes per retort per 24 hours. No difficulty has been experienced, however, in the variation and regulation of the throughput from 4½ tonnes down to 2½ tonnes per retort per day to suit the fluctuations in the demands for gas from the town. [1 tonne or metric ton = 0·9842 ton.]

The nominal maximum capacity of the whole carbonizing plant, therefore, including reserve, is based on the carbonization



PLAN OF THE PRAGUE-MICHLE GAS-WORKS.

1. Coal Store.
2. Retort House (Glover-West Verticals).
3. Coke Screens and Bunkers.
4. Bunkers for Unscreened Coke.
5. Coke Store.
6. Tar and Liquor Wells.
7. Condensers and Water-Tower.
8. Exhausters, Tar Extractors, and Washers.
9. Purifiers.
10. Meters.
11. Gasholder.
12. Sulphate Plant.
13. Experimental Plant and Laboratories.
14. Boiler House.
15. Booster House.
16. Locomotive Shed.
17. Electric Transformer Station.
18. Workshops.
19. Stores.
20. Main Offices.
21. Workmen's Baths, Canteen, Library, Laundry, &c.
22. Garages.
23. Porter's Lodge.
24. Living-Houses.



THE RETORT HOUSE AND COAL AND COKE HANDLING PLANTS.

of 320 tonnes of coal per day; and as the guarantee of 425 cub.m. of gas per 1000 kg. of crude coal (15,250 c.ft. per English ton) at a calorific value of 4900 Cal. (0° C., 760 mm.) per cub.m. (522 B.Th.U. per c.ft.) was comfortably attained during the guarantee tests, the nominal maximum output from the 80 retorts has been established at 136,000 cub.m. (4,802,820 c.ft.) per 24 hours.

The general details of the Glover-West system are too well known to require a long description. Suffice it to say, therefore, that the retort bench is surmounted by a battery of ferro-concrete coal storage bunkers (within the retort house), which have a capacity equivalent to 48 hours' supply to the retorts. The coal flows by gravity from the bunkers to the retorts; each retort being fitted at the top with an intermediate hopper surmounted by a coal valve, the intermediate hopper being in direct communication with the retort.

The coal valve is opened by hand every two hours to allow a sufficient quantity of coal to flow into the intermediate hopper, whence it gravitates to the retort proper at a speed regulated by that of extraction of the coke at the base of the retort. Each retort is fitted at the base with a continuously-operated coke-extractor of the West helical-plane type, which deposits the coke, already cold, into a large cast-iron chamber, whence it is periodically discharged.

The driving mechanism of each individual coke-extractor is fitted with a device permitting of easy regulation of the speed of extraction and consequently a corresponding regulation of the throughput of each individual retort. The main driving system operating the coke extractors is fitted with an accurate speed control also, so that the carbonizing speed of the installation as a whole can be quickly regulated at will without adjustment of the individual extractors.

Gas and Tar Systems.

The gas and tar systems within the retort house are of the usual type; an offtake pipe for gas and tar leading from each retort into a series of overhead collecting chambers where the primary condensates are separated. The gas passes from these chambers into a range of foul mains, and is led away, via the retort-house governor, to the condensers. The retort-house governor is of a well-known French design which enables the pressure on the retorts to be controlled accurately and maintained constant. The tar and ammoniacal liquor flow from the collecting chambers into a large tank (350 c.ft. capacity) within the retort house, whence they are pumped into the tar and liquor wells or circulated round the collecting chambers for flushing purposes. The gas and tar mains are, of course, complete with all necessary valves, doors, &c., for cleaning and by-passing and for the shutting-down of any individual retort or retort-setting.

The retort house itself, as will be seen from the accompanying illustration, is a ferro-concrete structure of a simple, massive, but pleasing design which harmonizes well with the other industrial buildings on the gas-works. An electric lift has been provided within the house to give easy access to all important platforms of the carbonizing plant and to the coal-conveyors above the bunkers.

Waste Heat Recovery.

The waste-heat recovery plant presents several minor divergencies from the practice which has identified itself with Glover-West installations in Britain. The waste gases, after circulating round the tops of the retorts, pass from the settings in the usual manner into a horizontal collecting flue running the full length of the retort bench; and the usual by-passes have been provided so that the gases can be diverted direct to the atmosphere via the chimneys when necessary or desirable. Instead of passing direct from the collecting-flue into waste-heat boilers within the retort house, however, the gases are conducted by two vertical down-takes into a separate boiler-house which adjoins the retort-house. This was the first installation of this type in Czechoslovakia; and according to the by-laws relative to steam-boilers which were in force at the time of building, the waste-heat boilers had to be housed in a separate building having brick walls of a certain thickness and a roof of specially light construction—the reasons for which will be self-evident.

Three waste-heat boilers of a French horizontal induced-draught type, designed to work at a pressure of 180 lbs. per sq. in., form the basis of the waste-heat recovery plant; but one of the three boilers is held as reserve. The down-takes and interconnecting flues within the boiler house are fitted with dampers and by-passes, so that any combination of the three boilers, with their attendant superheaters, can be operated to suit the circumstances.

The induced draught fans are also arranged to operate with each or any boiler, and are driven from an overhead line shaft. The latter can be operated by a horizontal steam engine on the floor-level of the boiler house or from an overhead electric motor.

The boiler house is equipped with a complete water cleaning and measuring plant and the usual standard accessories. Sufficient steam is raised from the waste heat to supply the retorts for steaming purposes, to drive the fans, feed-pumps, tar and liquor pumps, and coke-extractors, to heat certain of the buildings, and to provide a considerable surplus for general purposes on the works.

Refractory Materials.

The refractory materials for the retort-bench and waste-heat recovery system were obtained in Czechoslovakia, and were subjected to stringent tests before acceptance. Since the majority of the expansion of the silica goods takes place at comparatively low temperatures, considerable care had to be exercised in the drying of the settings. The latter were put under gaseous fire early in December, 1926, and no difficulties were experienced during heating-up and commencement of gas-making.

Coal-Handling Plant to the Retort House.

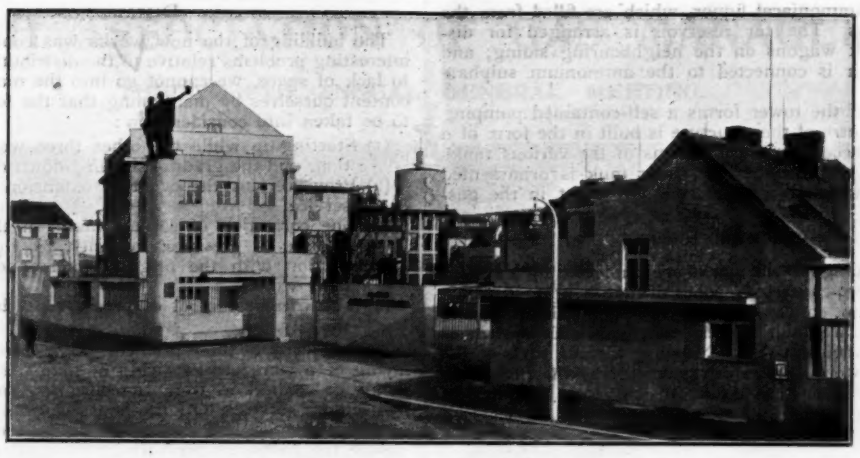
Coal is shunted on to the gas-works sidings in standard railway trucks of the 20 or 30 tonne size, and in normal circumstances is transported direct to the overhead bunkers of the retort bench. The wagons are of both side and end tipping types, and are handled, according to their respective types, by one of two wagon tippers; the coal being tipped into a large coal receiving hopper having a capacity of 40 tonnes of large coal. Owing to the fact that the axle lubricant of the wagons is in liquid form, they cannot be handled by rotary-tipplers of the type used in Britain.

From the coal receiving hopper, which is of ferro-concrete lined with steel plates to permit of "grabbing" from the pit to the store, the coal passes via the usual feeders into one of two large breakers. The broken coal gravitates from the breaker into a fixed bucket elevator which delivers it, at the retort-house floor-level, into a conveyor of the West lip-bucket type for elevation and distribution to the overhead bunkers in the retort house. The coal-handling plant is arranged in two separate lines, each comprising feeder, breaker, elevator, and conveyor, so that one complete line is always in reserve.

The handling capacity of each of these two lines is 60 tonnes of coal per hour; thus enabling the day's coal to be elevated to the bunkers in little more than 5 hours.

Coal and Coke Handling and Storing Plants.

The coal and coke handling and storing plants outside the retort house are arranged to form two halves of one complete unit, as shown generally by the accompanying works plan. Each half consists of an electrically-operated overhead telpher monorail arranged in the form of an elongated loop running at right angles to the length of the retort house. To the outside strand of each of these two long loops a travelling bridge is fitted; and each bridge carries an extension loop of the monorail, on to which the telpher machines can travel, thus permitting them to deposit or lift coal and coke at any desired point on the respective storage grounds. Six telpher machines



THE MAIN ENTRANCE TO THE GAS-WORKS.

of the standard man-carrying type operate on this monorail system—three for coal-handling and three for coke-handling—but in the normal course of events two machines are kept in reserve. Sufficient coal and coke can be stored to provide for three months' normal operation of the carbonizing plant; and the respective handling capacities to or from store of the two halves are 60 tonnes of coal and 45 tonnes of coke per hour. The coal to be stored is tipped from the wagons into the receiving hopper already mentioned, and transferred thence by telpher machines operating with grabs to any point of the store. In times of stress the coal is also grabbed direct from the wagons.

The junction between the two halves of the coal and coke handling telpher system is effected by two lines of monorail running parallel and in close proximity to the eastern wall of the retort house.

The coke is discharged from the chambers beneath the retort bench into travelling skips of the self-tipping type running on rails at the floor-level. The loaded skips are then pushed out of the retort house and picked up by the telpher machines for transport to the hopper for producer feed, to the screening plant, to the hoppers for unscreened coke, or to the storage ground.

The main coke storage bunkers are very fine structures in ferro-concrete, and the bunker for screened coke is topped by a roomy house enclosing the breakers and vibrating screens, together with their driving gears. Each of these two large bunkers lies directly beneath one strand of the overhead telpher-system, and each is equipped with doors and chutes for directing the coke to railway wagons or road vehicles. The bunker for screened coke is also equipped with apparatus for "bagging" and weighing the coke, and with platforms for loading the bags into purchasers' vehicles.

Auxiliary Apparatus.

Separated from the retort house by the underground tar and liquor tanks is the condenser house, which houses three water-tube condensers of a French vertical, circular type which have a cooling surface of 500 sq. m. (5400 sq. ft.). Each condenser is fitted with a tar extractor; and the whole of the connections, valves, and by-passes for the condensers are arranged above ground-level within the condenser house, suitable platforms having been provided to give easy access thereto.

In close proximity to the condenser house is the exhauster house, which houses two lines of plant, each comprising an exhauster, a "P. & A." tar extractor, a naphthalene washer, and an ammonia washer. Each line of plant is complete with the necessary inter and cross connections, by-passes, &c., and each is capable of dealing with 100,000 cub.m. (3,531,000 c.ft.) of gas per 24 hours, so that one unit of each piece of apparatus is always in reserve. The floor-level of the exhauster house is several feet above ground-level; and cellar doors, at ground-level, give access to the valves and connections beneath the floor of the house.

The exhausters are of the four-bladed Beale type. Each is driven by its own horizontal steam-engine, and each is controlled by a steam governor and by-pass valve. An additional automatic control is provided to the valve gear of each engine.

The "P. & A." tar extractors and the washers are of standard type, and do not call for special comment.

Parallel to the exhauster house, and within a few yards of it, is a purifier house of exceptionally handsome design. This is divided into two halves—one for the purifier boxes and crane, and one for the storage of oxide. Purification is effected in four compound boxes of the dry-lute type, interconnected so that they can be worked in any combination. The oxide, mixed with sawdust, is arranged in the boxes in two layers, each approximately 60 cm. (24 in.) deep.

Revivification is effected *in situ*, and the pumps supplying the necessary air are driven from the exhauster engines. Normally 2 to 3 p.ct. of air is introduced for this purpose, but the pumps are equipped with coned pulleys so that the percentage of air can be varied at will. The air supply system is equipped with the usual non-return devices.

A separate house, close to the gasholder, has been provided for the meters and station governors. The house contains two meters of the "Multiplex" type at present, each for a capacity of 100,000 cub.m. per day; and space has been left in the house for a third meter of a similar type.

Gasholder.

The gasholder is of the ordinary telescopic frame-guided type, and has four lifts with a total capacity of 75,000 cub.m. (2,649,000 c.ft.). The water tank is of steel, arranged above ground level on a foundation of ferro-concrete, and is 53 m. (174 ft.) in diameter, and has a height of 9·3 m. (30·5 ft.). The extended height of the holder is 48 m. (158 ft.).

For heating purposes during winter a hot-water circulating system has been fitted to the holder; the hot water being drawn from the main condensers.

Chemical Plant.

The Municipality has not yet arrived at a definite decision relative to the installing of plants for the extraction of benzole and the distillation of tar, and has contented itself for the moment with a plant for the manufacture of sulphate of ammonia and concentrated ammonia-water. This plant, which is housed in a separate building complete with a large underground sulphate store, is of a standard French pattern, and calls for no special comment. The plant as a whole is capable of handling 50 tonnes of ammoniacal liquor per 24 hours.

Test Plant and Laboratories.

A completely equipped test plant, which comprises a small gas-works in itself, has been installed in the laboratory buildings. One of the retorts of the carbonizing plant has been fitted with a separate coal bunker, and can be isolated from the bench and connected directly to the apparatus of the test plant. The latter consists of a condenser, a "P. & A." extractor, an electrically-driven two-bladed exhauster, a small washer, three purifier boxes, and a meter—all capable of passing 2000 cub.m. (70,630 c.ft.) of gas per 24 hours. In addition a small gasholder has been provided having a capacity of 2·5 cub.m. (88 c.ft.).

The equipment of the laboratories is modern and complete; no expense having been spared in purchase of the necessary apparatus. Suitable offices have been embodied in the laboratory buildings for the Chief Chemist and his assistants.

Boilers.

In addition to the waste-heat boilers of the carbonizing plant, a complete boiler house embodying two water-tube boilers of a local type has been installed. Each boiler has a heating surface of 175 sq. m. (1885 sq. ft.), and each is equipped with a mechanical grate for the combustion of coke breeze. The boiler-house is arranged alongside one of the railway sidings, and elevators have been installed for delivering the coke-breeze to the overhead bunkers. The working-pressure of the boilers is 180 lbs. per sq. in., and the steam is superheated to 300° C.

Water Tower.

A structure of ferro-concrete, approximately 35 metres (115 ft.) high, arranged at the railway end of the condenser-house in close proximity to the underground tar and liquor wells, supports a ferro-concrete water tank, having a capacity of 800 cub.m. The mid-structure embodies also small elevated reser-

voirs for tar and ammoniacal liquor, which are filled from the underground tanks. The tar reservoir is arranged for discharging into tank wagons on the neighbouring siding, and the liquor reservoir is connected to the ammonium sulphate plant.

The basement of the tower forms a self-contained pumping station, and the centre of the structure is built in the form of a lift-shaft, to give access to the platforms of the various tanks and to the top of the tower. The water tank is ornamented by a large clock which is visible from any point in the gas-works.

Drainage and Piping.

The various buildings in the works are connected by a system of underground ferro-concrete trenches of man-height, in which the hot-water, steam, condensed-water, ammoniacal liquor, and telephone systems are laid. Access to this trench system is obtained from manholes at ground level in various parts of the works, and the system is regularly patrolled by the inspection and repair men. The gas mains, of cast-iron, varying in diameter from 700 to 900 and 1000 mm., are laid in separate trenches.

Buildings and General Lay-out of the Works.

The various buildings are designed to harmonize into one complete *vue ensemble*, and are, in general, to the design or approval of the Municipal Architect. Each building consists of a ferro-concrete framework filled-in with panels of red brick. Due to the severe winters experienced in Czechoslovakia, the walls of the buildings have a thickness of 45 cm., and the roofs are insulated by sheets of cork surmounted by red tiles.

The general impression created by the buildings is one of imposing simplicity, and one realizes that the Municipality has spared no pains or expense in giving the gas-works an appearance of dignity and cleanliness worthy of comparison with the many fine establishments in the city. In this connection it might be mentioned that the outside concrete surfaces of the buildings have been finished by a marble-cement, and the interiors have been lined to the height of a few feet by coloured glazed wall-tiles.

Among the many commodious buildings constructed by the Municipality itself are the administrative offices, the windows of which command a view of the entire works; a large garage for cars and motor-lorries, surmounted and backed by the dwellings of the chauffeurs; a complete electric transformer station; large stores and workshops which comprise a well-equipped machine-shop and an up-to-date smithy; and also a magnificent canteen which is equipped with a luxury hitherto unknown on the Continent, and which comprises baths, laundries, kitchens, reading and recreation rooms, a mess-room, and a surgery.

The gas-works has been divided-up by a number of fine roads flanked by gardens, trees, and lawns; and the main entrance has been ornamented by a tall column bearing an allegorical group of statuary from the chisel of one of the best-known sculptors in the country.

Distribution.

The building of the new works was connected with several interesting problems relative to the distribution service. Owing to lack of space, we cannot go into the matter fully here, but content ourselves by mentioning that the following points had to be taken into consideration:

(1) Starting-up while the other three works were in operation, and the gradual shutting-down of the other works.
(2) Provision for the eventual extension of the distribution service.
(3) The correction of serious faults in the existing service, relative to pressure, quantity, &c., particularly in connection with the original interconnection of the three older works.
(4) The correct control of pressure at the various levels in the city.

The majority of these problems were solved effectively by the laying of a complete new ring of mains in the city, with ten points of connection from the new ring main to the existing distribution services. At the hours of maximum consumption, however, the pressure exerted by the holder was insufficient to ensure the necessary pressure at the most distant distributing exits from the new main, and the gas had to be sent into this new ring main under additional pressure. This necessitated the building of a compressor station at the works, and the fitting of a reduction governor at each of the ten points of connection between the new ring main and the existing distribution service.

The compressor station embodies three boosters of the Roots type, each capable of delivering 7500 cub.m. of gas per hour at a pressure which can be varied to a maximum of 2 m. of water-pressure (80 in.).

Of the three blowers, two are sufficient for the purpose; one standing always in reserve. Two of the boosters are driven by 80-H.P. direct-coupled vertical steam engines, and the variation in pressure is obtained by varying the speed of the engines from 160 to 460 R.P.M. The third, or reserve, booster is driven by an electric motor; and a rheostat enables the speed to be altered according to the desired pressure. The booster station is equipped with the necessary main and auxiliary governors, by-passes, and safety devices.

The official inauguration of the new gas-works took place on May 18, and was followed by two official banquets given by the Lord Mayor and the President of the Gas Committee respectively. These banquets were attended by the Representative of the President of Czechoslovakia (Dr. Benes), the Minister for Foreign Affaires (Dr. Baxa), the Lord Mayor, Mr. F. Titera (the President of the Gas Committee), various members of the Municipal Councils, representatives of the gas industry in Czechoslovakia, the Ambassadors and Commercial Attachés of Britain and France, and representatives of the Contractors.

The splendour of the opening ceremony and banquets, and the trend of the numerous speeches, all emphasized the importance which the Municipality attaches to this latest expression of its municipal enterprise.

FORTHCOMING ENGAGEMENTS.

Sept. 1.—Midland Junior Gas Association.—Meeting at the Council House, Birmingham, at 6.15.
Sept. 2-12.—Coke Oven Managers' Association.—Continental tour.
Sept. 7-9.—North British Association of Gas Managers.—Annual general meeting in Dumfries.
Sept. 13.—National Gas Council.—Meeting of Central Executive Board.
Sept. 13.—Federation of Gas Employers.—Meeting.
Sept. 16.—Gas Salesmen's Circles.—Annual meeting in London.
Sept. 22.—Wales and Monmouthshire District Institution.—Meeting at Porthcawl.
Sept. 23.—Southern Association of Gas Engineers and Managers.—Visit to the Torquay Works of the Torquay and Paignton Gas Company.
Sept. 30.—Eastern Counties Gas Managers' Association.—Annual meeting at Cambridge.
Oct. 3-5.—British Commercial Gas Association.—Sixteenth annual general meeting and conference at Southampton.
Oct. 27.—Midland Association of Gas Engineers and Managers.—Autumn general meeting, Grand Hotel, Birmingham, at 2.30.
Nov. 17.—Society of British Gas Industries.—Autumn General Meeting at the Hotel Cecil.

Institution of Gas Engineers.

Sept. 12.—Finance Committee.
Sept. 12.—Council meeting.
Sept. 12.—Visit to the Shipping Engineering and Machinery Exhibition at Olympia.
Sept. 13.—Education Committee.

Birmingham Enterprise.

Under the above heading, the "Melbourne Argus" of June 21 contains an interesting reference to the visit to Australia of Mr. D. M. Gibb, a Director and the General Manager of the Parkinson Stove Company, Ltd., of Birmingham, and states that a site has been purchased near Melbourne, and that the erection of the factory for the manufacture of gas cooking and heating appliances by the Parkinson Stove Company (Australia), Ltd., was commenced on June 10. The works will include a foundry, pattern shop, enamelling, nickel plating, and other shops, and also offices and showrooms. The buildings when completed will possess considerable architectural pretensions, and will be seen at close quarters by many thousands of railway travellers.

Society of British Gas Industries' Autumn Meeting.—We are informed by the Secretary (Mr. Arthur L. Griffith) that the autumn general meeting of the Society will be held on Thursday, Nov. 17, at the Hotel Cecil, London, under the Presidency of the Duke of Sutherland.

A Brochure on Coke.—In an illustrated brochure which they have just published, Messrs. G. R. Cawood & Co., Ltd., of Leeds and London, have endeavoured to meet the need for a brief description, in non-technical language, of the various kinds of coke and the purposes for which they are suitable. The booklet is well written, and should stimulate interest. Having described the bye-product coke oven, and horizontal and vertical retorts, the booklet deals in turn with the general properties of coke and its uses. The latter include steel melting, iron melting, iron making, brass melting, forging, lime burning, steam raising, central heating, open fires, and malting.

IRISH ASSOCIATION OF GAS MANAGERS.

THIRTY-FIFTH ANNUAL GENERAL MEETING.

[*Lafayette.*

AT BLARNEY CASTLE.

The Annual Meeting of the Association was held in the Central Hall, Academy Street, Cork, on Tuesday of last week, Aug. 16, under the Presidency of Mr. JOSEPH MCNICHOLL, M.I.Chem.E., Engineer and Manager to the Cork Gas-Works. Good weather and a good attendance of members, together with generous hospitality (extending over the two days) at the hands of the Gas Company, all combined to render the meeting a memorable one. Nearly a quarter of a century had elapsed since the previous meeting of the Association in Cork; and in the interval the only other occasion on which the members had journeyed so far south for their annual meeting was in 1911, when they went to Queenstown.

WELCOME TO CORK.

The PRESIDENT said they had with them the Chairman of his Company; and before commencing the business proceedings, he was sure they would be glad to hear a few words of welcome from him.

Mr. W. B. HARRINGTON, F.C.S. (Chairman of the Cork Gas Consumers' Company), on behalf of the Directors, then extended to the members a hearty welcome to Cork. They had, he said, asked Mr. McNicholl, who would preside at the meeting and at the subsequent functions, to do everything in his power to make the stay of the members in Cork as enjoyable as possible; and he was sure this important matter could not be in better hands. [Applause.]

PRESIDENTIAL ADDRESS.

The PRESIDENT then proceeded to deliver his address, which was reproduced in last week's issue of the "JOURNAL."

Mr. H. W. SAVILLE (Wexford), at its conclusion, said he had great pleasure in proposing that a hearty vote of thanks be given to the President for his excellent address. He had referred to many matters which must occupy to a large extent the minds of all of them. They were delighted with the manner in which he had placed these questions before them, though, of course, had it been permissible to discuss the Presidential Address, there might have been differences of opinion in certain directions—for example, in connection with carbonization.

Mr. W. E. YOUNG (Queenstown) remarked that it was a great pleasure to second the motion. He had also been requested, as the most recent Past-President present, to hand to Mr. McNicholl, in the name of the Association, the President's medal. In doing so, he wished Mr. McNicholl, on behalf of the members, long life and happiness, and every prosperity. He hoped they would have the pleasure of his company at these gatherings for many years to come.

The vote of thanks having been carried by applause,

The PRESIDENT expressed his gratification at the cordial manner in which the members had received his address. He felt only too conscious of the shortcomings of his effort. It, however, seemed to him quite impossible nowadays to prepare an address which would satisfy one's own self. That it had met with the approval of the members, afforded him much satisfaction.

COMMITTEE'S REPORT AND ACCOUNTS.

The HON. SECRETARY AND TREASURER (Mr. George Airth, of Dundalk) then read the following report of the Committee:

Your Committee have pleasure in reporting that, numerically speaking, the attendance of members and associate members of the Association at our meeting in Dublin on Aug. 17, 1926, was the largest since 1914. Your Secretary has again invited all gas managers in Ireland to attend our present conference. The papers read last year were most interesting and instructive. Mr. Allen's paper on "Valuation of Gas-Works" was an extremely valuable production. The discussions on all the papers showed the appreciation with which they were received.

The very trying time through which we have all passed in regard to coal shortage did not miss your Committee's attention. Communications were sent in September to Mr. Allen, of the Ministry of Industry and Commerce, drawing his attention to the small stocks of coals held by gas-works in the Free State specially, and Ireland in general. All works were then circularized as to the stocks used per week, so as to ascertain how long they could continue the manufacture of gas under the adverse conditions then prevalent. Mr. Allen's attention was also called to the fact that a coal ring was being formed, and it was pointed out that the Government should restrict prices to a reasonable figure. A circular was sent out asking all managers of gas-works to meet Mr. Allen in Dublin, in October. About thirty attended this meeting, and Mr. Allen explained that the Government could not restrict prices. The coal merchants had evidently thought that the coal strike was not going to last, and had made no provision for the emergency. No English coals were allowed to be exported, and we were entirely dependent upon American and Continental supplies. Through shortage of supplies, prices had soared, and, owing to the scarcity which was becoming acute, were likely to go higher. The Government were then negotiating for supplies for public utility undertakings; and this coal would be sold as cheaply as possible, when procured. Mr. Allen then proffered to dispense about 800 tons of coal lying in Athlone Barracks among the works which were lowest in stocks; and his kind offer was accepted. This coal probably saved the situation for about thirty small undertakings, until further supplies could be procured. The price repaid to the Government for these supplies was only 50 p.ct. of the then prices ruling in the coal ring. In December, 1926, the price allowed for imported coal was £5 5s. f.o.r. Dublin.

If we have taken the lesson of these experiences to heart, the first step to take in the event of another coal shortage will be to get together at once, and not to wait until our stocks are nearly exhausted, with the object of evolving some method of co-operative buying for the smaller undertakings. The assistance of the larger undertakings would be very helpful; and we are sure that if they were approached at the outset their help would be forthcoming.

The members are not yet taking full advantage of the ballot papers. We recommend that every member should vote.

The AUDITOR (Mr. G. W. Norman, of Dublin) then presented the accounts for the twelve months to Aug. 1 last, showing cash in hand at that date to the amount of £28 1s. He remarked that the members would be glad to see that they were £10

better off than was the case a year ago. Their ambition was to get together a sum of £100, and then to invest it. After that, as the saving of the first £100 was the most difficult, they might hope to go on more quickly in the matter of accumulating funds.

On the motion of Mr. A. Kirkham (Enniscorthy), seconded by Mr. W. Millar (Cookstown), the report and accounts were unanimously adopted.

Cork Gas Company's Generosity.

The Hon. Secretary said the members would be delighted to hear that the generosity of the Cork Gas Consumers' Company in inviting the members, as they had done, to luncheon and dinner that day, had been further extended to the point of defraying the cost of the excursion which had been planned for the following day. [Applause.]

Scrutineers.

The next business was the appointment of Scrutineers, to go through the ballot papers; and for this duty Messrs. L. P. Phillips (Dublin) and J. Oxley (London) were selected.

Report of District Representative on the Council of the Institution.

The President reported his regret that he was only able to attend the Council meetings which were held during Institution week in June last. There was nothing in the agenda of the other meetings bearing specially on Irish affairs, or he would have made an effort to attend on behalf of the Association. One of the meetings which he attended in June was of a purely informal character; and the most important matters discussed at the other meeting were the appeal of the National Gas Council and Associated Bodies for an increased subscription and the Education Scheme of the Institution. An overwhelming case for further support had been prepared; and the Council unanimously resolved to lend their support to the appeal. It was reported that the juniors in the profession had shown a very keen interest in the Education Scheme; and it was anticipated that increasing numbers would present themselves for examination each year. It might be of interest to learn that there had been a misconception, among some candidates for the Diploma, regarding the examiner's requirements in the matter of the thesis necessary for this distinction. It was recognized that it would be extremely difficult, and in the majority of cases an impossible task, for a young student to present something entirely original; but, on the other hand, the standard must be high enough to prevent a student with little more than text-book knowledge from passing out. He understood that the examiners undertook to make this matter more clear when the next syllabus was issued. He hoped the juniors in Ireland would avail themselves of this Scheme. It would be of incalculable assistance to them, and to the undertakings they served.

Election of Representative on Institution Council.

The President said it was their custom to nominate the incoming President as District Representative on the Council of the Institution of Gas Engineers. There was no doubt the ballot papers would show that Mr. Millar was to be their next President.

On the proposition of Mr. G. Walmsley (Londonderry), seconded by Mr. G. A. Gilmore (Warrenpoint), Mr. Millar was elected District Representative.

Concrete Roads and Liquid Ammonia.

Two papers were on the programme—one by Mr. W. Millar (Cookstown), on "Concrete Roads in Streets," and the other by Mr. G. Walmsley (Londonderry), entitled "Some Notes on Sulphate of Ammonia and the Manufacture of Liquid Household Ammonia as an Adjunct to a Sulphate of Ammonia Plant." These were both read, and a joint discussion ensued.

[Mr. Walmsley's paper was published in last week's "Journal;" while Mr. Millar's contribution, together with a report of the combined discussion, is reserved for our next issue.]

Officers for 1927-28.

The Scrutineers announced the election of the following officers for the ensuing twelve months:

President.—Mr. W. Millar, Cookstown.
Vice-President.—Mr. L. W. Dalby, Wicklow.
Members of Committee.—Messrs. J. V. Mearns, Newry; H. A. Thomas, Longford; E. J. Edmonds, Waterford.
Auditor.—Mr. G. W. Norman, Dublin.
Hon. Secretary and Treasurer.—Mr. G. Airth, Dundalk.

New Members.

The gentlemen named below were submitted for membership, and elected:

Ordinary Member.—Mr. P. Lyne, Killarney.
Extraordinary Member.—Captain R. D. Pollock, Enniskillen.

Apology for Absence.

The Hon. Secretary said he had received a letter from Mr. G. W. Anderson, of London, expressing his regret at not being able to be present to meet the President and members of the Association, and his best wishes for a successful meeting.

Next Meeting Place.

Next year's meeting of the Association will take place in Belfast.

Luncheon.

This concluded the Association's business meeting, and the members and ladies adjourned to the Victoria Hotel, where they were the guests of the Cork Gas Company at luncheon—the President in the chair. This pleasant function was quite informal—there being no speeches.

National Gas Council Meeting.

The afternoon was devoted to a meeting of the Irish District Executive Board of the National Gas Council of Great Britain and Ireland, at which there were addresses by Mr. E. J. Fottrell and Mr. W. M. Mason. A report of the proceedings at the meeting appears on other pages.

The Dinner.

Again at the invitation of the Cork Gas Company, members of the Association, ladies, and friends, to the number of more than a hundred, sat down in the evening to dinner in the Victoria Hotel, when, with music, song, and toasts, a thoroughly enjoyable time was spent. Unfortunately the Chairman of the Company (Mr. W. B. Harrington), who had welcomed the members in the morning, was unable to be present, and two of the Directors were away on holiday. The President (who was accompanied by Mrs. McNicholl) was in the chair, and was supported by Senator J. C. Dowdall and Mr. David McDonnell (Directors), and Mr. Richard Healy (Secretary).

The President submitted the first toast—"Eire." The Association, he remarked, drew its membership from the whole of Ireland. He therefore asked them to drink to "Ireland—north and south, east and west—peace and prosperity."

The Shannon Scheme.

Senator Dowdall, of the Free State, responding, said that he had taken the opportunity of glancing through the President's address, and he was in cordial agreement with him upon one point—that was, as to the supply of electricity which would be generated by the Shannon scheme. This electricity would lighten and brighten all the rural parts of Ireland, and if applied to agriculture would prove of great assistance. Also, if properly utilized, its application to village and cottage industry would be of value. But beyond this he was perfectly certain that any gas undertaking which was capable of standing on its own feet had nothing to fear from electrical competition. In Cork they had a sound and prosperous gas undertaking alongside an electrical undertaking which he was also pleased to say was sound and prosperous; and since the establishment of the latter concern, the Gas Company had multiplied itself in its output many times. What had happened there, he felt sure, would apply equally to other districts where like conditions might arise consequent upon the advent of the Shannon scheme. The prosperity of both gas and electricity was dependent upon the prosperity of the country itself. If the country prospered, they would prosper.

The toast of "Kindred Associations" was proposed by Mr. E. J. Edmonds, who urged the necessity of all organizations in the industry continuing to pull together. The response was by Mr. E. J. Fottrell, who stressed the importance of the industry, as light and heat were essential services, at any rate in these latitudes; and by Mr. Kilpatrick (of the British Road Tar Association), who suggested that an Irish Road Tar Association would doubtless prove as beneficial to the gas industry as the like organization was doing in England.

Acknowledgments to Mr. Fottrell.

Senator Dowdall said that, as all of them were aware, the Electricity Bill had gone through, and had become an Act by which all the previous Electricity Acts were removed. Fortunately, in the passing of the measure they had been able to secure a great number of provisions safeguarding interests which otherwise would have been affected. He wished to impress upon them the fact that, while one Electricity Act had gone through, it was very probable that, as time went on, other similar Acts might be promoted; and for this reason it was all-important to secure not only the force which they themselves would be able to exercise, but the influence and power which kindred associations might also be able to bring to their aid. He therefore welcomed this opportunity of publicly thanking Mr. Fottrell for the time and energy which he had devoted to the work of safeguarding the interests of the gas industry during the passing of this Act. [Applause.]

Mr. G. W. Norman proposed a hearty vote of thanks to the Cork Gas Company for the generous hospitality they had extended to the Association members and friends. He said that he knew and loved the late Mr. Denny Lane, who, when he reached the age of 78 years, expressed the opinion that it was "about time he retired, and gave up lying for the Gas Company." [Laughter.] He did not retire for some years; and the Gas Company prospered. Originally there were two Gas Companies in Cork. Now there was only one; and he hoped that this one might long flourish, so that the grandchildren of those present might look up to it as a model undertaking in years to come.

Mr. McDonnell replied, and pointed out that recent events had shown the necessity for united action. They were all greatly indebted to Senator Dowdall for his assistance during the passing of the Electricity Bill. The Cork Gas Company had in Mr. Healy, Mr. McNicholl, and Mr. Travers an executive of which any undertaking

might be proud—and the Company were proud to possess such officials.

Col. GLOVER proposed "The Ladies," which was responded to, on their behalf, by Mr. W. M. MASON; and before the close the President was toasted, with musical honours, at the call of Mr. J. A. PEMBERTON, who declared that the meeting had been a huge success.

THE EXCURSION—AND A PRESENTATION.

On Wednesday, members and friends were again the guests of the Gas Company. Assembling in the morning outside the

[*Lafayette.*

Presentation to Mr. George W. Norman, who has been Auditor since 1900.

Gas Offices in South Mall, motor coaches took them to the Henry Ford Motor Works, where much of interest was seen. Then one party, in charge of the President, were driven to the St. Ann's Hydro for lunch; while the remainder, in the care of Mr. Healy, returned for a similar purpose to the Victoria Hotel. Afterwards the parties joined, and the drive was resumed to Blarney Castle.

Here, among the beautifully situated ruins, and in close proximity to the "enchanted" stone, a happy time was spent, the enjoyment of which was enhanced by a pleasant little ceremony. This was the presentation by the members of a silver tea service and salver to Mr. George W. Norman, who for many years has been a "pillar of strength" to the Association.

The PRESIDENT, addressing the assembled company, said he had thought his speechmaking was over; but he found that this was not the case, and that he had yet another very pleasant duty to perform. In spite of his pleasure, however, he approached the duty with great diffidence, because he felt utterly inadequate to do justice to it. The Association had decided to present a token of their regard and esteem to one of their oldest members. It was but a small token. Indeed, it was extremely small, when they considered the yeoman service which the recipient, Mr. George W. Norman, had rendered to the Association. He (the President) would require a more fluent tongue and a more vivid imagination than he possessed in order to do full justice to the occasion; and so instead of attempting the impossible, he was going to call upon Mr. Airth, who had had the privilege of knowing Mr. Norman for a very much longer time. He felt sure Mr. Airth could voice their sentiments far more aptly. He knew of no other gentleman who had won the regard of the members of the Association to such a degree as Mr. Norman had done. In fact, the feeling they entertained for him was more one of love. He had never before performed so pleasant a function as that of asking Mr. Norman to accept this gift.

Mr. GEORGE AIRTH remarked that he was delighted to have the opportunity of saying a few words as to the way in which Mr. Norman had assisted the Association almost from the time of its inauguration. The Association had now been in existence for exactly forty years, having, he believed, been started in 1887; while Mr. Norman's connection with it dated from 1892, so that he was certainly the oldest Extraordinary Member. For the past 27 years he had performed, to their entire satisfaction, the duties of Auditor. He had looked both after the finances of the Association and after the Treasurers. Having been Treasurer for about twenty years, he (Mr. Airth) knew something of the difficulties through which the Association had passed, and through which Mr. Norman, with his great kindness, had helped them. His work as Auditor had been only a small part of what Mr. Norman had done for the Association. He had assisted them in obtaining new members, and had always afforded valuable help in connection with the organizing of the annual excursions. When the Hon. Secretary and Treasurer had been given a vote of thanks for the work he had done for the Association, in nine cases out of ten it had been Mr. Norman who had made the arrangements, though the Secretary had had the credit. Mr. Norman had endeared himself to every member. The present they were giving was quite inadequate to mark his services; but they knew that what he had done had always been done willingly, for the benefit of the Association. Their wish was that he and Mrs. Norman might live many years—Mr. Norman to do much more good work for the Association, and Mrs. Norman to be among them with a kindly word for everyone. [Applause.]

Mr. NORMAN feelingly expressed his thanks for the handsome gift, and his warm appreciation of the kindness which had prompted it.

CORK GAS-WORKS.

During their stay in Cork, many of the members of the Association took the opportunity of inspecting the gas-works, over which they were shown by the President and his Assistant, Mr. Patrick J. Sheehan, B.E. The works, it may be stated, cover an area of about 6 acres, and are situated 300 yards from the Albert Quay on the South Channel of the River Lee.

CARBONIZING PLANT.

The carbonizing plant is installed in one retort house, which is 212 ft. long by 73 ft. wide. The house contains 16 settings of eight horizontal retorts ⊃ section 22 in. by 16 in. by 20 ft. long. The retorts are charged and discharged by two electrically-driven "D.B." machines.

A coal store of 3500 tons capacity runs practically the full length of the retort house. A coal crane with Priestman grab runs on an overhead gantry; and by means of this coal from any part of the store can be taken to the two receiving hoppers of the coal breakers at stage floor level. There are two sets of coal handling plant, each comprising breaker with top and bottom claw shafts, and bucket elevator, all driven by 20 H.P. motors. Each elevator discharges the coal into an overhead hopper of 30 tons storage capacity. The plant is equipped with an Avery automatic weigher.

A "D.B." longitudinal coke conveyor, motor driven, operates on the discharging side. It may be arranged to convey coke from two or all three of the benches alternatively. This conveyor in turn feeds an inclined cross conveyor, which takes the coke to the yard.

Part of the stage floor construction of the house is of reinforced concrete, and independent of the bench bracing.

CONDENSING, EXHAUSTING, AND WASHING.

The condensing plant consists of two sets of atmospheric condensers, and one reversible water-tube condenser of a daily capacity of 1 million c.ft.

The exhauster house contains two Bryan Donkin exhausters driven by horizontal steam engines, one of a capacity of 80,000 c.ft. per hour, and the other of 150,000 c.ft. per hour.

Continuous current at a pressure of 220 volts is generated by two 20 KW. dynamos, each driven by a gas engine.

There are two Holmes rotary scrubbers on the double unit system, with a central drive, each of 2 million c.ft. per day capacity, and one Livesey washer of a capacity of 1½ million c.ft. per day.

PURIFYING PLANT.

A new purifying plant, occupying the site of the old plant, was erected in 1925. This consists of six 30 ft. by 25 ft. by 6 ft. purifiers of the luteless type, in a stage floor house. The oxide is hoisted by two bucket elevators at one end of the house. Two lines of 24 in. rubber belt conveyors running the length of the house over the boxes convey the oxide. Special "throw-off" carriages direct the oxide to any box desired. There are four discharge shoots and four covers to each box; and the latter are raised by 1 ton Morris blocks.

Curtain walls of concrete, 6 in. thick, are built on the steel-

work supporting the boxes to a height affording ample weather protection. The gables are panelled with concrete bricks.

METERS, GOVERNORS, AND HOLDERS.

Two station meters are installed capable of registering 100,000 and 50,000 c.ft. per hour respectively.

Workshops.

Reading from left to right: Machine Shop, Meter Shop, and Smithy (Ground Floor). Carpenters' Shop (First Floor).

Three station governors—two of Braddock's equilibrium station type—are installed, varying in size from 24 in. to 10 in.

There are three holders, of approximately 1,000,000 c.ft., 500,000 c.ft., and 100,000 c.ft. capacity, respectively.

SULPHATE AND TAR PLANTS.

The sulphate of ammonia plant has a daily output of 30 cwt. of sulphate. There is also a neutralizing and drying plant (Dr. Weyman's process), which consists of a 24 in. centrifuge "Weston" type, driven by a vertical steam engine, an elevator, push-plate conveyor, and rotary screens of simple construction.

The tar distillation plant consists of a Wilton patent dehydrator and two pot stills, each of 8 tons capacity. There is a complete set of storage and settling tanks, and also mixing tanks for Road Board Tar and other preparations.

WORKSHOPS.

The workshops are of reinforced concrete construction, brick panelled, with steel window sashes, and comprise machine shop, meter shop, smithy, and carpenters' shop. The machine shop is 70 ft. long by 35 ft. wide, and is approximately 25 ft. high. The equipment of this shop includes a 3 ton travelling crane, radial drilling machine, screwing machines, &c. The power is supplied by a "National" gas engine of 25 H.P.; and the shafting is mounted on "S.K.F." ball-bearings. An extension of this shaft provides the power for a circular saw and other machines in the carpenters' shop.

LABORATORIES.

There is a well-equipped laboratory and coal testing plant,

Purifier Installation by Messrs. Clapham Bros.

and in addition a test room equipped with all the apparatus prescribed for the use of the gas examiner.

GAS OUTPUT.

The coal carbonized for the year ended June 30 last was 27,945 tons, and the output of gas 401,600,000 c.ft., of 475 B.Th.U. quality. From July 1 last, the quality was increased to 500 B.Th.U.

NATIONAL GAS COUNCIL IRISH EXECUTIVE BOARD.

MEETING IN CORK.

Following the annual meeting of the Irish Association of Gas Managers, there was a meeting, in the afternoon of Tuesday, Aug. 16, in the Central Hall, Academy Street, Cork, of the Irish District Executive Board of the National Gas Council of Great Britain and Ireland. It was to have been presided over by Mr. W. J. Grey, A.C.A., Secretary of the Alliance and Dublin Consumers' Gas Company, the Chairman of the Irish Board; but as he was prevented from coming to the meeting, Mr. RICHARD HEALY, Secretary of the Cork Gas Consumers' Company, the Vice-Chairman of the Board, was called upon to take the chair.

The CHAIRMAN said his first duty was to welcome the members to Cork. It was, he thought, the first time that a meeting of the Irish District Executive Board had been held there.

APOLOGY FOR ABSENCE.

The ACTING SECRETARY (Mr. H. W. Saville, of Wexford) read the names of the undertakings who had joined the National Gas Council, and also the following letter of apology for absence from Mr. R. Bruce Anderson (a member of the Central Executive Board representing the Irish District):

I am very sorry I cannot attend the meeting in Cork.

Our members will have seen what has been done generally by the Council during the past year from its monthly reports. The chief matter particularly affecting Ireland was watching the Electricity Supply Bill, in which we got numerous amendments beneficial to the gas industry, at a cost of some £250 or so.

When the Bill was promoted, we got in touch with the Cork and other Gas Companies, and acted through Mr. J. Ronan, Solicitor, of Cork, who is Secretary to the Waterford Gas Company, which I manage. We sent him twice to Dublin; and I arranged for Mr. Fottrell (Joint Manager of the National Gas Council) to be in Dublin with him, when they did yeoman work interviewing officials and members, with the result that the gas industry in Ireland is as well protected as the English gas industry under analagous circumstances.

I was on the Committee which prepared the Coal Contracts Guide, and had it made applicable to sea-borne deliveries to cover Irish gas undertakings.

On the proposition of Mr. J. A. PEMBERTON (Sligo), seconded by Mr. L. W. DALBY (Wicklow), Mr. J. D. Smith, M.Inst.C.E., of Belfast, was elected Chairman of the Board for the ensuing year. The mover remarked that, as the next meeting was to be held in Belfast, this would be a most appropriate choice.

The CHAIRMAN proposed as Vice-Chairman Mr. Grey, of Dublin, and expressed the opinion that they could not have a better man.

Mr. G. WALMSLEY (Londonderry), in seconding, expressed the opinion that they could not do better than have in these positions the representatives of the two premier gas undertakings in Ireland.

The motion was carried.

Moved by Mr. PEMBERTON, and seconded by Mr. WALMSLEY, it was agreed to add Mr. George Airth, of Dundalk, to the existing Management Committee.

The CHAIRMAN said that unfortunately Mr. Airth had resigned his position as Hon. Secretary to the Irish District Board, and it was necessary to fill his place.

Mr. AIRTH remarked that, as the late Hon. Secretary, he had much pleasure in proposing as his successor Mr. Saville, of Wexford.

Mr. J. MCNICHOLL (Cork) seconded this, and it was unanimously agreed to.

The CHAIRMAN said this concluded the routine business, and it was now his pleasure to call upon Mr. Fottrell to address the meeting.

ADDRESS BY MR. FOTTRELL.

Mr. E. J. FOTTRELL (Joint Manager of the National Gas Council) remarked that he saw from the agenda that he was expected to give a review of the year's work of the Council; but he did not intend to inflict anything of that kind upon the members—especially as 1926 had been one of the busiest and most strenuous years that had been encountered since the Council came into being. There were, however, one or two outstanding features in connection with the work which had been done that would be of interest to everyone present; and he proposed to restrict his remarks to these subjects.

ELECTRICITY SUPPLY BILL.

In the letter which had been read, Mr. Anderson referred to the Electricity Supply Act; and probably this was one of the legislative measures which had most affected the gas industry

in Ireland—or at any rate the Irish Free State—for many years. He thought he could safely say that what they had done in this direction had protected the interests of gas undertakings in the Irish Free State as well as one could reasonably have expected. At the outset they had suffered from a considerable disadvantage, because it was only two days before the Committee sat in the Dail that they were able to get a copy of the Bill, and this they obtained through the courtesy of the Chairman of that day. When the Bill reached headquarters in London, they immediately set to work to go through the 111 clauses and 2 schedules (he believed it was), to see what was necessary to protect the interests of the gas industry. When the full strength of the Bill came to be understood, it was quite evident that there were two or three protective clauses which it was essential should be inserted. There were half-a-dozen others which were desirable; but with the short time at disposal, it became necessary to concentrate on the essential points. They were under a great debt of gratitude to the Directors and the officers of the Cork Gas Consumers' Company for the assistance which they rendered at that early and important stage of the Bill. The first "snag" they came up against was that, having determined upon the form which these essential amendments should take, they found that, according to the procedure, they were already out of date—and this was only about forty-eight hours after receipt of the first available print of the Bill. The effect of this was that all their work had to be done on the third reading and report stage, and when the Bill was presented in the Senate. The actual work done occupied a considerable amount of time; but, after all, what concerned the members most was the result achieved.

Meeting Obligations.

He thought it was only right he should say that from the very outset the manner in which they were received by the Minister in charge of this Bill left nothing to be desired. They explained to him quite frankly that what they wished to secure was freedom to carry on their own esssential work under conditions which would be at least equal to those obtaining before the introduction of the Bill; and he thought that in the course of a very short time they satisfied him that this was all they were out to secure. As a result, this gentleman went quite a long way to meet their legitimate objections to the Bill as drafted. When one considered that this Bill at one stroke removed all existing electricity legislation subsequent to 1882, and substituted for it regulations which for the most part were to be put into operation by an Electricity Supply Board that was nominated by the Government, it could easily be realized that there was a lot which had to be done. For a good many years gas, water, electricity, and other pipes and cables had been laid down under the conditions set out in the Electric Lighting Clauses Act of 1899, which provided that one person should give notice to the other, and so far as possible refrain from damaging the property of other persons, and generally laid down a principle of "give and take." These provisions were swept away, and nothing was put in their place, except that the Board might make regulations, if they thought fit. This was not considered satisfactory; the Council wanted something altogether more definite. Eventually it was decided that, before regulations were made, the Board should consult the Minister; and the Minister gave an undertaking that he would see that their interests were protected. As the clause was finally passed, it provided that, if any new regulation was proposed to be passed by the Board affecting gas, such regulation should be made only after proper investigation by the Minister. It was quite clear that anything relating to the laying of cables underground was likely to affect gas undertakings; and they were clearly entitled to be heard in regard to the validity of any such regulations.

Rate Aid for Electricity Undertakings.

The next point that rather concerned them was that, under the Act, the Board could shut-down any private or municipal generating station. In fact, it had complete control, not only of the production of electricity, but of its transmission and distribution to the individual. But the Board could authorize any municipal authority to undertake the local distribution and supply. Past experience on the other side of the Channel had shown that this was not always safe. The Council had persistently fought for years for the insertion of a clause to prevent a municipal authority running its electrical undertaking in such a way that it had to be assisted out of the rates. In the past they had not got—and they did not see much prospect of getting—any clause into public legislation in England to ensure that a municipal electricity undertaking should be made to pay (that was to say, that it should not be a charge upon the rates); but when they put the question to Mr. McGilligan that there was in this Bill nothing to prevent municipal undertakings in the Free State being a charge upon the rates, he saw the reasonableness of their contention. The result was that they had got in the Act a provision whereby the Board, who had the power to fix the charges, could require any local authority so to vary or increase its rates that the distribution of electricity by it was self-supporting. This was a very important achievement from the point of view of the gas industry, because one often found that the gas company, if not the largest ratepayer, was at any rate one of the largest ratepayers in the district; and so if the electrical undertaking were run at a loss the gas undertaking would, out of the rates it paid, be called upon substantially to assist its competitor. The matter was approached very carefully, and he thought it was something of an achievement to have got a provision into this Act which they had not yet succeeded in getting on the other side of the Channel.

There were certain minor points with which it was not necessary to deal. Among other things, it would be recollected that the Act conferred power of compulsory purchase; but there was a saving clause to the effect that the Board could not acquire compulsorily the property of any gas undertaking. That provision, however, left out of consideration the property of a gas undertaking not on its own land—*i.e.*, pipes and services—and as they to-day constituted a large proportion of the capital invested, it was necessary to provide for them. Where the gas undertaking had acquired the easement or right over land for laying pipes, the Board was now similarly precluded from compulsorily purchasing that land.

In the Act as passed, he thought they would see very little that they need be afraid of so far as the actual provisions were concerned. But he knew that a number of people had expressed great apprehension that, with the passing of this Act, or at any rate with the commencement of the supply of electricity under it, the gas industry would decline. He was certainly not one who supported this rather pessimistic view. On the contrary, he was quite satisfied that the view expressed by Mr. McNicholl in his Presidential Address that morning was the right one, and the only one they could afford to take. In the past their business was that of purveyors of light; but to-day this branch constituted—and he might say should constitute—but a minor portion of their activities. They were now essentially purveyors of heat, for both industrial and domestic purposes.

Nothing to Fear from the Development of Electricity.

If they took care to develop this side of their business to the fullest possible extent, he felt quite satisfied that they would have little or nothing to fear from the development of electricity. In fact, he would go further. He could imagine perfectly well that an electricity scheme such as they had in the Irish Free State, if it achieved any considerable portion of the results that were hoped for, might quite well do the gas industry a great deal more good than harm. If they took the world's greatest example of electrical development, the United States, it would be found that, not only was the gas industry there not declining, but it was progressing by leaps and bounds; and a strange and interesting feature was that this progress had been vastly more marked since electrical development had become more intense. Considering manufactured gas alone, and leaving out of account natural gas, the output of gas in America to-day was 50 p.ct. greater than that of electricity, if they were taken on a comparable basis. In Chicago, which was held to be the greatest example in the world of the utilization of electrical energy, the 3 million population used 1000 units per head per annum. Yet the consumption of gas in Chicago was not 50 p.ct. greater than electricity—that was the average for the United States—but it was 75 p.ct. greater. He thought, therefore, there was nothing inherently unsound in the idea of gas and electricity developing side by side.

Reduce Costs and Improve Service.

But it was not sufficient to sit down and wait for this development to come about. They had first to reduce the cost of production, and then to give the best possible service; and they must go out into the field of heating, whether domestic or industrial, in which undoubtedly the future of gas lay. If they did these things well, they would have nothing to fear, and they would have a great deal to hope for, from the intelligent development of electricity for the purposes for which it was suited—namely, power and lighting. The lighting load of the gas industry must, he thought, inevitably decline. By first-class maintenance, they would probably hold a considerable proportion; but although electricity was many times more costly than gas, there were many people who were prepared to pay this extra cost for the sake of the additional convenience which electricity sometimes offered. On the other hand, it must always be remembered that any such loss could be more than counteracted in the field of domestic and industrial heating—and in domestic heating, of course, one included cooking. What would really happen if these advocates of the all-electric house and of the all-electric age were to succeed in attaining the object at which they professed to aim? Take, for example, the cooking load between 12 and 1 o'clock on Sunday. If the electrical people were to undertake to provide the heat to meet this peak load, and even if they were able to utilize electricity for heating purposes at an efficiency of 100 p.ct., and if gas were calculated as being supplied at an efficiency not exceeding 60 p.ct., the electrical people would require 2¾ million horse power to supply the heat for this one hour's cooking in London

alone. In other words, to tackle the gas industry's peak load, they would have to put down from sixteen to eighteen times the generating plant they had to-day; but long before they reached that stage, they would see bankruptcy staring them in the face. What was the position in Toronto? They had cheap water power, and some people bought current for all purposes at ½d. per unit, and yet in Toronto there were 140,000 gas cookers and only 2000 electric cookers. These few examples would at any rate show what had been the experience in other parts of the world, where these things had already been put to the test.

Gas Legislation.

The other matter which had been occupying most of the time of the National Gas Council was gas legislation. Omitting the Gas Regulation Act of 1920, and knocking out that utterly incomprehensible Act of 1859 called the Sales of Gas Act, they were now working under legislation passed in 1847 and 1871. This was an intolerable position. The two last-named statutes were really framed to meet the case of people who were in those times given a monopoly to supply a form of lighting in a specified area. They were regarded as monopolists, and as therefore being in a position to fleece all and sundry. Thus it was considered necessary to provide a series of restrictions so as to counteract these proclivities. Times had, however, changed, and to-day the idea of gas being a monopoly was simply futile. Gas was in competition with electricity for lighting and power, and with coal for cooking and heating; and what they asked was that they should be placed in a position to compete with coal, oil, and electricity upon equal terms. Nobody told the coal supplier or the oil supplier how much capital he must put into his business, how he must raise it, and how much money he might borrow. The gas industry was expected to compete to-day under conditions which made it almost impossible for it to compete. They were asking that the legislation governing the raising of capital and the general financial arrangements of gas undertakings should be brought into conformity with modern conditions. They were asking that if necessary they should be allowed to borrow money equal in amount to the fully-paid ordinary capital. They were asking, also, that they should be put into a position to issue capital at least at par. To-day it was difficult to raise a 7 p.ct. stock at par, whereas in former times it could be raised at 5 p.ct.

This legislation would not affect them in Ireland, whether in the North or in the Free State; but he mentioned these matters because what they succeeded in getting on the other side of the Channel it should be possible for them to obtain in Ireland much more easily. The pioneer work would have been done, and they could decide how much of what had been obtained they would wish to adopt. Then, when the time came, they would be able to go ahead and secure these improvements.

Flat-Rate System of Charge.

Perhaps he ought to mention that another thing they were asking for was authority to depart from the flat-rate system of charging for gas. However cheaply they might be able to produce the gas, however good the service might be, it was not really sufficient. They wanted to be able to go out into the industrial market especially, with a price that would enable them to compete. If those present analyzed their accounts to-day, they would probably find that anything up to 30 or 40 p.ct. of the consumers were being supplied with gas at a figure lower than it cost to produce it. They were asking power, where found desirable, to establish a service or consumer charge on the same principle that the telephone service was worked. They were under obligation to supply gas at any time it might be required, and they argued that they were entitled to call upon the consumer to pay for that service. A minimum service charge to all the consumers would enable them to make an immediate cut of (say) 25 p.ct. in the price charged for gas. This would be a great advantage in encouraging the industrial load.

Tar Able to Meet all Requirements for Roads.

Mr. Millar, in his paper that morning, had placed the gas industry under a great debt of gratitude. They wanted it to be known as widely as possible that tar, far from being an out-of-date thing, was to-day as capable of fulfilling the requirements of road surveyors as it was in the early days when it was used solely to lay the dust. The British Road Tar Association had recently come into existence for the purpose largely of making good an omission of previous years, when it was thought that the uses of tar were so great that it would continue to be employed without its merits being extolled. It was the object of the new Association to make known the real facts to the public. He asked the members to do everything they possibly could to encourage the work of that Association.

The National Gas Council.

While on this point, he would like to say something in regard to the subscription to the National Gas Council. It was not a case of money, when it came to the very small undertakings. The subscriptions they sent (and for which the Council were duly grateful) hardly covered the cost of the printing and postage on the literature circulated. But even if this service were rendered at a loss, it was of first-rate importance that they should have 100 p.ct. of the gas undertakings of these Islands in the National Gas Council. One never knew what might be coming along. One must keep in touch with things; and those who stood outside and kept aloof from what was being done, were running a risk which no one ought to run. The danger nowadays of getting out of touch with the national bodies which were promoting the welfare of the industry, was too great for anyone to incur. He would therefore ask them all to impress upon their Boards or Committees the fact that a small subscription to the National Gas Council and the Road Tar Association was more in the nature of an investment than an outlay.

Mr. Airth's resignation from the position of Secretary of the Irish District Board was greatly regretted. They really did not know how to contemplate the Irish Council without Mr. Airth as Secretary. He would like to say how much they all owed him for the work which he had done for them in the past. The work of the Council would be far less efficient were it not for the part played by the District Executive Boards, and they were grateful for what Mr. Airth had done in particular.

Is Publicity Necessary and Profitable to the Welfare of the Gas Industry?

Mr. W. M. Mason (Manager of the British Commercial Gas Association) then read the paper on this subject which was reproduced on pp. 303-5 of the "Journal" for Aug. 17.

Appreciation.

Mr. Airth said he thought that the very hearty thanks of the Irish District Board should be accorded Mr. Fottrell and Mr. Mason for their excellent addresses. The work that had been done by the National Gas Council, with the assistance of the gas companies, and he might say of the Irish Association, in connection with the electricity question had been most valuable. He (Mr. Airth) had an interview with Mr. Cosgrave, and perhaps paved the way a little for what was afterwards done by the National Gas Council and the gas companies. The "Northumberland" clause was a thing for which they had been fighting for many years; and the Council had assisted them to get something which would be of real benefit to them. Mr. Fottrell had shown them how to take an optimistic view of the future of gas; and he quite agreed with him in what he had said. Those who were threatened with the new electricity supply had better put their houses in order, and secure as good a heating load as possible now. In Dundalk, their electricity supply started in 1913. In 1900, they were making 28 million c.ft. of gas, while in 1913 the output was 56½ millions. In 1916, after the electricity supply had come into operation, the make of gas had dropped to 32 million c.ft. Part of this reduction was, of course, due to the large supply which had previously had been taken by the railway works in Dundalk. Since then, by taking every possible step to get as many domestic supplies as they could—but more especially by paying attention to the cooking load—they had raised their output to a little over 47 million c.ft., which he believed would be not only maintained, but improved upon. He had suffered from the fact that in Dundalk the electricity scheme was controlled by the Urban District Council, who permitted him to put cooking apparatus into the houses belonging to them, but would not allow any gas lighting. Hitherto, there was no doubt, the industry had been treated in a monstrous way in regard to the conditions attached to the issuing of the capital which had to be expended upon their undertakings. They were compelled to put their shares up to auction, and had their hands tied. If the National Gas Council could get through in England the proposals which Mr. Fottrell had outlined, there was every reason to hope that the whole of Ireland would similarly benefit. He wished to thank Mr. Fottrell for the kind remarks he had made with reference to what he (Mr. Airth) had done as Secretary of the Irish District Executive Board. He did as much as he could do in the circumstances. The circumstances were, as all knew, a great war, and also a little upset among themselves; and for a time their meetings unavoidably suffered. If he might be allowed, he would like to make a special appeal for brotherhood between North and South in regard to their industry. He trusted that on future occasions, as this year, the National Gas Council would hold their meetings along with the Irish Association, and that everyone who possibly could would come along, and thus make that brotherhood what it was before the war. Some gas undertakings, he was sorry to say, did not give their gas managers the assistance they should, to enable them to come to these meetings. In his opinion, each gas manager's expenses should be defrayed for him. One point that should be urged upon the Government was that these expenses "should be" allowed. At present, he believed, they "might be" or "could be" allowed. Mr. Mason had said all that could be said on the subject of his paper. Every member should take to heart what he had stated, particularly with regard to service. He moved a hearty vote of thanks to both Mr. Fottrell and Mr. Mason.

Mr. Walmsley added his testimony to the great help they had received from these gentlemen. At one time, he said, his

own Directors were very diffident about paying their quota, but ultimately they decided that it would be a good proposition. Now, owing to the great activity of these organizations, during the past twelve months in particular, they had realized so fully the benefits derived from membership, by themselves and other undertakings in the country, that his Board had quite recently determined to increase their subscription to the fullest new limits. ["Hear, hear."]

Mr. McNICHOLL said he had much pleasure in seconding the vote of thanks proposed by Mr. Airth. It was very gratifying to learn of the steps the National Gas Council were taking with regard to securing the removal of restrictions from gas undertakings in England. They would be glad in Ireland to hear that these measures had been successful, and then they would be able to get to work themselves in the same direction. It was very hard on gas undertakings that they should be so restricted. There was no reason why they should not occupy the same position of freedom as other traders. Mr. Fottrell had elaborated in an excellent manner some of the points which he (Mr. McNicholl) had made in his address that morning. He wished specially to pay his tribute to the good work that had been done in conection with tar propaganda. Of course, the work was not done by the Council itself; but they thanked the Council for having introduced the body who now dealt with this subject, and felt assured that the interests of the tar producers would be looked after very much better in the future than they had been in the past.

The CHAIRMAN also spoke of the great assistance he had received in 1921, when his Company applied to come under the Gas Regulation Act. Then, of course, the trouble arose, and they had the unique experience of applying for an Order in two countries. They received on the second occasion the same assistance from the Council as on the first. He might say that his Company secured the first Order in the Free State under the Gas Regulation Act.

The vote of thanks was then put to the meeting, and carried with applause.

Mr. FOTTRELL remarked that it was very gratifying to know that such assistance as the Council were able to render was appreciated. He knew the difficulty there was in the fact that they had to rely upon one meeting a year, so far as the National Gas Council and the British Commercial Gas Association were concerned. He was delighted to think that any idea which might have been prevalent in the old days, that the Council were interested in English undertakings only, or even in English undertakings mainly, had been dispelled. The whole of their service was at the diposal of anybody who required it. In large questions the Council themselves took the initiative; but there were matters which touched only a small number, and if such were brought to the notice of the Council they would be only too pleased to give what help they could. As to expenses of members attending meetings of technical associations, so far as England was concerned a section was specially inserted in the Electricity Supply Bill last year authorizing local authorities who were electrical undertakers to defray the expenses of officers attending meetings of associations such as the Irish Association, the National Gas Council, or the British Commercial Gas Association. They were naturally, in their proposals for new gas legislation, asking for a similar provision; and there was no doubt it would be granted. More freedom was certainly required in regard to capital matters, and he felt sure that most of the proposals under these heads would meet with little or no opposition. In fact, he contemplated a successful issue for their proposals generally; and if they went through, there should be little difficulty in securing similar enactments in Ireland.

Mr. MASON also briefly returned thanks.

Before the meeting closed, Mr. AIRTH stated that, even though he had resigned his position as Secretary, his help would always be at the disposal of the National Gas Council.

ELECTROLYSIS OF MAINS BY STRAY CURRENTS FROM TRAMWAY SYSTEMS.

[Extracts from a paper by M. H. Sarrade before the Annual French Gas Congress.]

In the case of the Sté. d'Eclairage, Chauffage, et Force Motrice, whose distribution system extends throughout the suburbs of Paris, where the tramway systems have never ceased developing, the study of the cause and effect of the phenomenon of electrolysis of mains has always been a matter of great importance; but of recent years the problem has become really serious. The gravity of the question may be gauged by the following facts. Between 1910 and 1926, excluding the period of the war, during which observations of electrolysis were necessarily abandoned—that is to say, in twelve years—9600 m. [10,500 yds.] of 80 to 600 mm. [3·1 to 23·4 in.] pipe and about 1100 lead service pipes were put completely out of action and had to be replaced. These figures relate to cases definitely proved against electrolysis; and for these the Gas Undertaking has received by way of damages over 900,000 frs.

One has, of course, to realize that the harm done by stray tramway currents is not confined to the gas pipes, but has equally bad effects on all other conduits; and one can readily picture the systematic opposition which the Tramway Undertakings put up in discussing what amounted to a serious public danger. Since 1921, the electric cables of eight different undertakings have been linked-up; and this has facilitated the taking of protective measures and records by the E.C.F.M. As a result, the Company have had the satisfaction of witnessing the improvement of a situation which they considered critical. Their experience has shown that in the case of well-laid lines normally 12 to 30 p.ct. of the return current may find its way through the earth to pipes in the vicinity. In some cases, however, they have come across as much as 60 p.ct., usually when old horse tramlines have been converted to electricity without adequate arrangements being made for the return circuit.

THE PATH OF STRAY CURRENTS.

In making a study of the general situation, the first thing to be done should be the experimental determination of three distinct zones. The first is the zone in which the current leaves the tramlines and makes its way through the earth to the pipes. Such zones are normally found at the rail head or in a district where the bonding of the lines is indifferent. The existence of such a zone is easily detected by a voltmeter between the rail and the pipe, with its positive terminal to the former. The Company have frequently detected potential differences of 10 to 20 volts when tram motors have been put in motion near the end of the track.

The next zone to be determined is that in which the currents proceed longitudinally in the pipes. Here the electricity always flows towards the nearest substation or towards the earth contact of a negative feeder; and it follows the line of least resistance. These currents are easily measured by millivoltmeters, the reading of which immediately reveals the direction of pressure drop on the pipe; and if the resistance of the section of the pipe is known, a simple calculation will give the current intensity. In dealing with wrought-iron bitumen-coated pipe, current intensities have been calculated of the order of a few milliamperes to as much as 6 or 10 amperes. Another method consists in sectionizing the main and connecting an ammeter in series; and by this means the liability to error is diminished.

The third zone is where transverse currents are again met with, which complete the closed circuit by making their way to the negative bar at the substation—either direct to the latter, or by way of a negative feeder and the track. A voltmeter is connected between the pipe and the rail; and it will always be found that the potential difference of the former is the higher. Such measurements do not necessarily prove that electricity is passing from pipe to rail, but that the general conditions are favourable to such action.

The author then proceeds to discuss briefly the theory of electrolytic corrosion; and in doing so he refers to the interesting paper read by M. Chappuis at the 1922 Congress of the Société Technique, to which reference was made in Vol. 157 of the "JOURNAL," p. 498. The experiments of M. Chappuis put beyond doubt the fact that it is at the points where the current leaves the pipe to make its way back to the electric system that electrolysis occurs.

EFFECT OF ELECTROLYSIS ON VARIOUS KINDS OF PIPE.

M. Sarrade includes in his paper a number of most interesting photographs, which admirably illustrate the havoc wrought by electrolysis.

If the pipes attacked are of cast iron, in the event of electrolysis being caused by the "bridging" action of longitudinal currents—as in the case of a pipeline with joints of low electrical resistance—the damage is localized near the joints, either on the pipe itself or on the flanges, in the form of craters and cups, the sides of which are extremely friable. The bolts of the flanges usually exhibit the worst deterioration; they waste away at the middle of the shank, and eventually wear right through. Examples of this are shown in fig. 1.

If it is transverse currents which are responsible, more or less pronounced craters are found grouped together. The cast iron becomes friable and may sometimes be cut by a knife; struck by a hammer, it no longer gives a metallic ring. If a piece of the pipe wall is examined, it is immediately found to have suffered remarkable diminution in weight; and when cut, it shows only a reduced thickness of bright metal. The latter phenomenon is due to the fact that, from the outside inwards, the wall is for some distance composed of carbonate of iron and graphite. The latter are the electro-negative elements of the

salts contained in the earth, which combine with the iron of the pipe.

In the case of wrought-iron bitumen-coated pipes, interesting observations have been made of comparatively recent cases of corrosion. The latter is localized on the small surfaces which correspond to fissures in the bitumen; and for this reason the corrosive action is very rapid. As soon as the coating is perforated, oxidation of the pipe takes place; and the primary cause of its deterioration is likely to be masked by this rusting. It is of great importance, therefore, to discover the attack in its early days; and this may be done in certain fashion by the mark of rust on the bitumen. If the bitumen is cut away round this mark, one or several partly-formed craters may be found; and a little scraping will often break through the pipe. Figs. 2 and 3 illustrate the damage to such pipes.

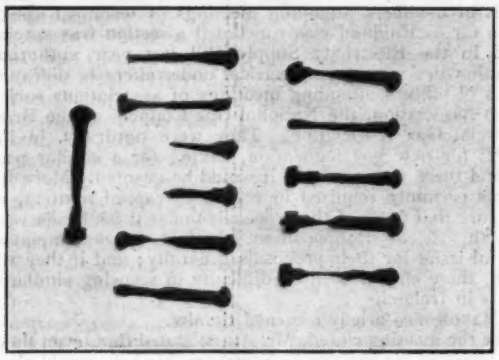


Fig. 1.—Specimens of Corroded Bolts from Rubber-Jointed Flanges.

Fig. 2.—Early Stages of Corrosion of W. I. Bitumen-Coated Pipe.

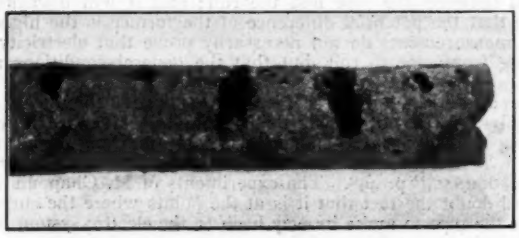


Fig. 3.—Effect of Prolonged Action on a W. I. Bitumen-Coated Pipe.

The E.C.F.M. have come across a certain number of cases in which pipes have exhibited about a hundred blemishes and perforations without it being possible to say definitely what has caused them. Always such damage has been localized near branch pipes, or more exactly in the neighbourhood of the section of the pipe which has at some time been recoated after the insertion of a branch. When stronger currents—say, 3 to 6 amperes—are involved, danger spots may be looked for on the sleeves of the joints; this being due to the low resistance of the joint, and to the ease with which the jointing material is affected.

In the case of lead pipe, the commencement of corrosion is manifested by the appearance of a grey crust of carbonate or by the black or blue-grey colouration of sulphur; and when this crust is removed, the crater will be revealed (see fig. 4). When the corrosion of lead pipe is well advanced, the metal is literally gnawed away and perforated over surfaces measuring as much as several square centimetres; the soil in the vicinity is metallized; and dusty metallic deposits form on the battens which support the pipeline or on the interior walls of the conduit in which the pipe is laid.

It is useful to analyze samples of earth taken from the neighbourhood of electrolized pipes, for this always allows recognition of the composition of the electrolite (soluble salts), of the products of the electrolysis (metallic iron or lead) in greater or less proportion, and of the products of secondary reactions.

Fig. 4.—Eight Months' Action on a Lead Pipe 4 MM. Thick.

TRACING THE OFFENDERS.

The study of a system of stray electric currents commences with the measurement of potential differences, or preferably the continuous registration during twenty-four hours of the values and the directions of these differences. These measurements merely indicate that there is a possibility of current flowing between the rails and the pipes, or vice versa; and they should always be supplemented either by continuous registration of the variations of pressure drop which occur when electricity flows along a pipe, or preferably by continuously recording for twenty-four hours the variations in the intensity of the currents.

Examination of the various charts of potential difference, pressure drop along a main, and current intensity will make it possible to fasten the whole or part of the responsibility on a particular offending undertaking. All that is necessary is to compare the average values recorded during running hours with the low values given at night when there is no traffic. Typical charts are reproduced in figs. 5 and 6. A further test is to cut-out one feeder or a group of feeders for periods of two minutes, when the obtaining of such a chart as is shown in fig. 7 will again reveal the guilty section of a system.

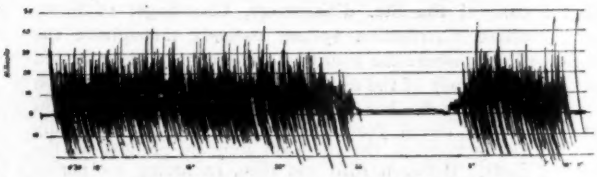


Fig. 5.—Pressure Drop between Points 25Metres Apart.

Note practical disappearance between midnight and 5 a.m., when tram traffic ceases.

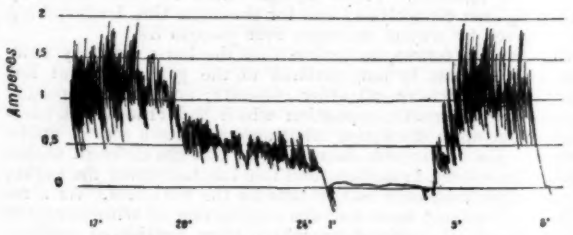


Fig. 6.—Current Variations in a Pipeline.

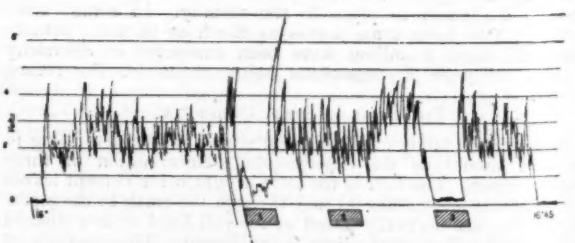


Fig. 7.—Chart of P. D. Obtained by Cutting-Out Sections of a System.

1 and 2 indicate periods when different groups of feeders were cut out. 3 was a period of total cut-out.

In the case of litigation, these tell-tale charts are documents of the greatest value, and will secure reparation with the minimum of argument. Apart from this, continuous supervision from the electrical point of view has the merit of revealing immediately any defects that may arise in the tramway system;

and the E.C.F.M. have thus avoided much trouble by scotching it at the outset.

PRECAUTIONS TO BE TAKEN.

There must, of course, be the closest collaboration between the tramway and the gas undertakings; and it should be pointed out that any useful work which the electrical undertaking may carry out must have its counterpart in the application of protective measures by the gas company—measures which will involve expense by no means out of proportion to the advantages which accrue.

Much benefit accrued to gas undertakings by the Order of April, 1924, relating to tramway undertakings, the most important clauses of which were directed towards the preservation of sound electrical bonding between the rails, and towards regulations for the proper disposal of return feeders. As regards the latter, attention must be given to equilibrium of potential at the earth point of negative feeders; careful allocation of the current intensity in each of them; and regular verification of the average pressure differences between the end points of the feeders and neighbouring pipelines. Further, it is the responsibility of the tramway undertakers to increase the resistance between rail and earth by adequate rail beds and by a proper system of drainage.

On the part of the owners of subsoil pipelines, attention should be given to the following points:

(1) The resistance of the earth-pipe circuit should be increased to the maximum, which in practice means keeping pipelines as far away as possible from the tramlines—especially in districts where the pipes and the rails run parallel. Wet and impermeable ground should be avoided.

(2) They should increase the resistance of the point of contact between earth and pipe. In this regard, it should be pointed out that the tar applied to cast pipes, the bitumen covering of wrought-iron pipes, and the conduits enclosing lead pipes offer purely nominal resistance when in the ground. The asphalted jute wrapping of the Mannesmann tubing would appear to be best from an insulation point of view. The approved course to pursue is to lay cast and wrought pipes in a bed of fine sand, and lead services in jointless tubes made of a mixture of cement and asbestos.

(3) Finally, attention should be given to reducing to the minimum the conductivity of the pipes, notably by the employment of numerous insulating joints distributed equally over the whole length of the main.

Since 1921, these various precautions have been applied by the E.C.F.M. as occasion offered during maintenance and extension works; and simultaneously the tramway undertaking has done all in its power. The results have been excellent—not to say that all current derivations have been suppressed; but the reduction of the intensity to a few milliamperes allows the Company to hope that the ill-effects of corrosion will not begin to appear for many years.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Price of Cast-Iron Pipes: A Fallacy Refuted.

SIR,—I read with great satisfaction the letter which appeared in your recent issue from the Managing Director of the Stanton Ironworks Company, Ltd., regarding the cast-iron pipe trade.

I would like, on behalf of my own firm, the Staveley Coal and Iron Company, Ltd., to publish an equally emphatic disclaimer. We too feel that there is a widespread suspicion among buyers as to the existence of a Ring, or Association, in the cast-iron pipe trade. As our competitors state, no such organization is in being in any form. The attitude of the Staveley Coal and Iron Company is well known throughout the mining, iron, and chemical industries as being diametrically opposed to Rings or Trusts in any guise whatsoever. We are firm believers in the interplay of competitive conditions, from the standpoint both of national interests and the healthy development of the fittest of manufacturing concerns. The fact that foreign pipes can be sold at the existing phenomenally low prices is due to obvious economic causes, which are widely known and irremediable.

D. N. TURNER,
Managing Director.

The Staveley Coal and Iron Company, Ltd.,
Near Chesterfield,
Aug. 19, 1927.

REGISTER OF PATENTS.

Gas Lighting Apparatus.—No. 274,603.

ALLAN, A. B., of Glasgow.

No. 12,958; May 20, 1926.

In apparatus according to this invention, a fitting or body member, provided with a valve or cock having an operating handle or lever, is located at the lower end of a gaspipe, and is provided with a burner and means for supporting an inverted incandescent mantle. Carried by the body member and located in a suitable position adjacent to the burner and mantle, a secondary jet and a flint and steel ignition means are provided. This secondary jet is located slightly to one side and above the mantle, is adapted to direct a jet of gas downwards, and is supplied with gas through the valve or cock provided on the body member. The operating handle or lever is of the double-acting type—that is, when the one end of the lever is down, the gas is on, and when the other end of the lever is down the gas is off. The lever is operated by pendent pull chains or the like.

A spindle adjacent to the secondary jet has loosely mounted thereon a disc with a serrated edge and a spring-controlled trigger lever, which are connected together so as to turn as one member on the spindle. The operating lever is provided with a pin adapted to engage under the trigger lever when the operating lever is in the off position. The first portion of the movement of the operating lever turns the gas on to the burner and mantle. Continued movement of the lever supplies the secondary jet with gas; and at the moment that this secondary jet directs the gas downwards, the pin on the operating lever releases the trigger lever, which, with the disc, turns rapidly back and causes a spark between the edge of the disc and a flint carried by a suitable holder. Upon the operator releasing the lever, it moves back to an intermediate position, by means of a spring or the like, so that the gas supply to the secondary jet is cut-off and the main gas supply to the burner and mantle remains on.

Retort Settings.—No. 274,154.

TOOGOOD, H. J., and DEMPSTER, R., & SONS, LTD., both of Elland.

No. 7099; March 15, 1926.

The patentees, discussing the "main arch" form of construction for silica settings of horizontal retorts, point out that it prevents each setting being designed to absorb within itself its own expansion. With the series of main arches abutting one upon the other, the expansion of each, though equal, is cumulative, and shows to disadvantage in the beds which are towards the ends of the bench.

According to this invention, the patentees seek to overcome this accumulation by localizing and absorbing all movements within the particular setting. This is done by omitting entirely the main arch, and building in its place a substantial dead-weight covering of bricks, tiles, or the like, supported directly on the stay walls of the retorts. There being no abutments as in the erstwhile main arches, clearance spaces can be left between the flat bench cover and the pier walls to allow of the expansion of the cover in each bed; and such clearances, being external and visible, can be cleared before heating up the setting. These bricks or tiles may be rectangular or other standard shapes commercially obtainable without being specially made for the particular application.

Thus, no clearances are required to absorb the upward growth of silica, as the covering, while at all times efficiently buttressing the top retorts against the bursting stresses of the stoking machinery and buckled charges, will simply yield or lift as and where required, and accommodate exactly every change in the expansion and after-expansion of silica from the several horizontal piers of retorts beneath. Thus the local thrust referred to is overcome.

When resetting every four to six years, the covering will be rebuilt from the old bricks; and in this there is advantage, as the retort setters are not working in the cramped position under the erstwhile hot main arch and between hot benches, but have full head room and a relatively cool atmosphere in which to work.

In laying the bricks, a row on edge may be set directly on the top of each stay wall, so as to form a **T** head with it. Above the **T** heads, courses of bricks are laid to complete the bench cover, and a final covering of insulating material or paving may be superposed above the top layer.

Drawings accompany the specification.

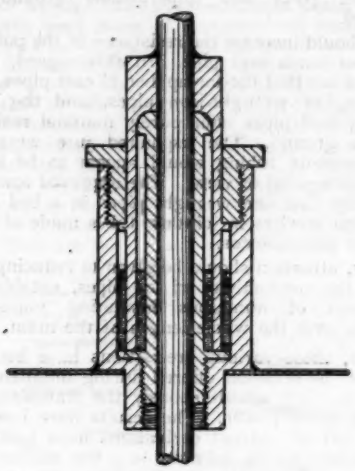
Stuffing Box for Meters.—No. 274,631.

TAUNTON, R. P., and MCINDOE, R. W., both of Birmingham.

No. 16,970; April 7, 1927.

According to the present invention, the shaft which requires sealing passes through a sleeve having its extremity in contact with the inner end of an inverted cup member to form a close joint therewith;

the extended extremity of the sleeve being a sliding fit in the inverted cup to prevent the passage of fluid present above the liquid.



Meter Stuffing-Box.—Taunton and McIndoe.

A feature of the invention consists in forming the sleeve with an enlarged head; and the inner end of the inverted cup forms a seating against which the head bears. A further feature consists in the provision of a gland nut on the cup member bearing at its inner end against a peripheral shoulder on the exterior of the inverted cup member.

The device, of which we reproduce a vertical section, is so constructed as to be easily adapted to any spindle or rod in the instrument, and by its construction is non-spillable, in case the instrument should be placed otherwise than in the upright position.

Gas Fires.—No. 274,787.

OAKLEY, P., RICHARDSON, W. H., and STOVES, LTD., all of Rainhill.

No. 14,673; June 1, 1927.

The patentees state that with the ordinary perforated tubular radiant in connection with a bunsen burner, the radiants of a gas fire are entirely exposed to air from the exterior; such air flowing in a general current against the front of the radiants, so that to some extent, while becoming heated as it approaches, it nevertheless tends to have a cooling effect upon the surfaces of the radiants. The invention is designed to obviate this cooling effect and to produce a more intense heat in the radiants themselves. To this end it consists essentially in the provision of a perforated integral blanket of asbestos or other suitable material placed close against the radiants to the whole general extent of their surfaces, whether the radiants are of the straight, swan-necked, or curved type, so that individual currents of air are set up through the perforations in the blanket, and cause the radiants to become more highly incandescent and so radiate a more intense heat through the perforations of the blanket.

Radiants for Gas Fires.—No. 274,791.

OAKLEY, P., RICHARDSON, W. H., and STOVES, LTD., all of Rainhill.

No. 14,902; June 7, 1927.

The patentees point out that the bunsen flame of a gas fire passing into the radiant at its lower end assumes an outer shape of a size almost equal to that of the cross-sectional bore of the radiant, and often with a central solid portion of flame of conical formation immediately above the burner. Should the apex of this solid portion come in contact with any portion of the radiant, a carbon deposit is formed, setting up a disagreeable smell. The invention is designed to overcome this defect by providing the radiant with an enlarged or bellied bore immediately above the lower end of the radiant, so as to give room for a greater expansion of the bunsen flame.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 17.]

Nos. 20,808—21,377.

BERRIDGE, J.—"Gas-producing furnaces." No. 21,340.
COPPING, H. M.—"Gas rings." No. 20,852.
FRANCIS K. H.—"Apparatus for remote control of incandescent gas lighting." No. 20,887.
GAS LIGHT AND COKE COMPANY.—See Francis, K. H. No. 20,887.
GAS LIGHT AND COKE COMPANY.—"Furnaces." No. 20,888.
GAUQUIER, M.—"Process of removing graphite incrustations from coke ovens." No. 21,072.
LAHAUT, L.—See Gauquier, M. No. 21,072.
LIMBERG, H. J.—"Coke-chamber closures." No. 21,198.
LUCAS, E. E.—"Gas burners for furnaces." No. 21,273.
PERRIN, R.—"Gas generator." No. 21,031.
STETTINER CHAMOTTE-FABRIK AKT.-GES. VORM. DIDIER.—"Apparatus for discharging coke ovens." No. 20,907.

MISCELLANEOUS NEWS.

ALLOA CORPORATION GAS DEPARTMENT.

Gas Consumers Pay for Electricity Losses.

At a meeting of the Gas Committee, Mr. J. W. Napier, Engineer and Manager, submitted his estimate of the income and expenditure for the current year. Coal is estimated to cost £12,000 less, the difference being due to the circumstances of the strike last year and to a reduction in the rate per ton. Rates and taxes would be less by £1100; and residual products—coke, tar, and sulphate of ammonia—would yield approximately £3000 less than during the previous year. The estimates show a gross profit of £19,520; and after deduction of sinking fund and interest charges, also income-tax amounting to £9020, the net profit for the year is estimated at £10,700. In ordinary circumstances, this profit would effect an all-round reduction in the price of gas of 1s., 2d. per 1000 c.ft., making the price 3s. 1d., compared with the present rate of 4s. 3d. per 1000 c.ft. As, however, the profits of the Gas Department are required to meet losses resulting in the working of the Electricity Department, the Town Council have agreed to retain the price of gas at the high figure of 4s. 3d.

The sum paid out of the Gas Department to the Electricity Department for last year was £5000, making a total of £20,000 for the past four years. The loss in working of the Electricity Department last year was £8600; and accumulated losses at May 15 last are £42,403. The Town Council recently sold their Electricity Works to the Scottish Central Power Company.

The Town Council are at present considering a proposal to get parliamentary power to impose a general tax on the ratepayers; the income derived to go to meet in part the accumulated deficit. It is intended to continue to tax gas consumers direct through increased gas rates.

Included in the proposed new gas legislation by the National Gas Council is the removal from the Statute Book of the Electric Lighting (Scotland) Act, 1890, thus making impossible the payment of losses incurred by Corporation electricity departments from gas rates.

PERFORATION OF A GAS-PIPE BY INSECTS.

Though lead-boring insects are known in other countries (especially the Tropics), it has been generally understood that such attacks are never experienced in Great Britain. A case recently brought to the Oldham Corporation Museum is worth notice. In the early part of the year a house was built, and the gaspipes were fitted, in a suburb of Oldham. In August, when the meter was fixed, and the gas was turned on, a serious leakage was noticed. After considerable search, the plumbers found a neatly drilled hole nearly a quarter of an inch in diameter in the lead pipe fixed to the joist under the bedroom floor. Subsequent examination disclosed a large insect in a burrow in the wood exactly facing the hole in the pipe. Afterwards, other burrows were found in the joist, and three of the insects were found opposite the same number of holes in the lead pipe.

The insect is the "Giant Saw Fly," or "Tailed Wasp," or "Wood Wasp;" and probably it has other popular names. The scientific name is *Sirex gigas*, and if a genuine native of this country it must be rare in the wild state. On the Continent it is extremely common in pine woods. The female lays eggs on the timber (either living trees or cut logs), and from the eggs are hatched grubs which mine in the wood. When the grubs are becoming mature, they bore towards the surface, and the adult emerges as a large fly, nearly two inches across the wings, with a terrifying resemblance to a huge wasp or hornet. Infested timber is constantly imported, and these wood wasps are often killed in timber yards, new houses, coal mines (from pit props), and occasionally in the open.

Apparently there exists no previous British record of *Sirex gigas* attacking metal; but cases have been recorded in France, where this insect is a common native. In one instance, the lead sheeting on a roof was perforated. The most extraordinary affair, however, was at the Grenoble Arsenal many years ago, when the bullets in a box of cartridges were found to be completely perforated by this insect. The grubs had been in the wood of the box, and when mature had emerged on the inside instead of the outside, burrowing industriously but blindly through the bullets, instead of working round them. Some of the insects were found dead, actually buried in the gunpowder of the cartridges.

In the Oldham case, the gas was not laid on. Otherwise, as soon as the insect had made the minutest perforation, it would have been killed by the escape of gas, and the resulting leak might easily have escaped the most thorough scrutiny unless the pipe had been lifted away from the timber.

Entomologists generally consider that the grub lives not more than two years in the wood; but wood wasps have emerged from the timber of a house three years old. It is difficult to detect the presence of these insects in timber; but when they emerge, they leave circular burrows about a quarter of an inch in diameter. In connection with mysterious leakages of gas in new houses, the agency of *Sirex gigas* might well be borne in mind when examination is being made. It may be added that, in spite of the formidable wasp-like appearance, this insect does not sting or bite, and is absolutely harmless when handled.

INSTITUTION OF GAS ENGINEERS.

EDUCATION SCHEME EXAMINATIONS, 1927.

First List of Successful Internal Candidates.

FROM Mr. Walter Hole (the Organizing Secretary), we have received for publication the following list of successful internal candidates in connection with the recent examinations in Gas Engineering and Gas Supply under the Institution's Education Scheme. Several cases have been referred for further consideration; and successes will be published in due course. The list of successful external candidates was published in the "JOURNAL" for July 6.

BIRMINGHAM MUNICIPAL TECHNICAL SCHOOL.

Gas Engineering—Ordinary Grade.

Name.	Class.	Ancillary Subjects Taken.
Nicholls, Frank Harold	1st	Electrical Engineering, Machine Drawing.
Truslove, Cyril F.	1st	Organic Chemistry, Applied Mechanics, Heat Engines.
Tildesley, William Robert David	2nd	Maths., Chemistry, Physics, Applied Mechanics and Heat Engines.

Gas Supply—Ordinary Grade.

Evans, Cyril Thomas	1st	Maths., Chemistry, Physics, Mechanics and Heat Engines.
Armitt, Reginald	1st	Maths., Chemistry, Physics, Mechanics and Heat Engines.
Beech, William Weston	2nd	Maths., Mechanics, and Heat Engines.
King, Harvey John	2nd	Maths., Chemistry, Physics, Mechanics and Heat Engines.

BLACKBURN MUNICIPAL TECHNICAL SCHOOL.

Gas Engineering—Ordinary Grade.

Pinder, Ashworth Higham	1st	Maths., Chemistry, Engineering Drawing, Engineering Science.
Smith, William Norman Hoyle	2nd	Chemistry, Physics, Machine Drawing.

EDINBURGH HERIOT-WATT COLLEGE.

Gas Engineering—Ordinary Grade.

Ford, John	1st W.D.	Chemistry, Physics, Heat Engines, Applied Mechanics, Engineering Drawing.

GLASGOW ROYAL TECHNICAL COLLEGE.

Gas Engineering—Ordinary Grade.

Tran, Alexander	1st W.D.	Maths., Chemistry, Physics, Mechanics, Engineering Drawing.
Horn, Robert Colvin	1st	Maths., Chemistry, Physics, Dynamics.
Maguire, Owen	1st	Ancillary subjects covered by B.Sc. in Chemistry.
Robertson, George Wallace	1st	Ancillary subjects covered by first two years of Course for B.Sc. in Chemical Engineering.
Symon, Frank Goodall	1st	Chemistry, Fuels.
Rule, John Macfarlane	2nd	Maths., Chemistry, Physics, Dynamics.
Sloan, George	2nd	Ancillary subjects covered by B.Sc. in Chemistry.
Sturrock, Norman Collie	2nd	Maths., Chemistry, Physics, Dynamics.

W.D. = With distinction.

Gas Engineering—Higher Grade.

Macfarlane, Alfred Anderson	1st	Chemistry, Fuels, Electricity, and Magnetism.
Lorimer, Henry	2nd	Ancillary subjects covered by B.Sc. in Chemistry.

Gas Supply—Ordinary Grade.

Horn, Robert Colvin	1st	See above.
Lorimer, Henry	1st	"
Robertson, George Wallace	1st	"
Sturrock, Norman Collie	1st	"
Symon, Frank Goodall	1st	"
Tran, Alexander	1st	"
Graham, Kenneth Seton	2nd	Maths., Chemistry, Physics, Dynamics.

HUDDERSFIELD TECHNICAL COLLEGE.

Gas Engineering—Higher Grade.

Beaumont, Frank	2nd	Mechanics and Heat Engines, Engineering Laboratory.

Gas Supply—Ordinary Grade.

Sykes, Frederick William	2nd	Maths., Mechanics and Heat Engines, Graphics, Machine Drawing, Th. of Machs.

LEEDS TECHNICAL COLLEGE.

Gas Engineering—Ordinary Grade.

Hanson, Frederick A.	2nd	Inorganic Chemistry, Organic Chemistry, Maths., Physics.

Gas Supply—Ordinary Grade.

Bell, Frederick	2nd	Inorganic Chemistry, Organic Chemistry, Applied Mechanics, Machine Construction.
Simpson, Arnold	2nd	Applied Mechanics, Machine Construction.

LIVERPOOL CENTRAL TECHNICAL SCHOOL.

Gas Engineering—Ordinary Grade.

Name.	Class.	Ancillary Subjects Taken.
Bratterzani, Frederick William	1st	Inorganic Chemistry, Organic Chemistry, Physics, Chemistry of Fuels.
Foulds, Robert Whalley	1st	Inorganic Chemistry, Organic Chemistry, Physics, Chemistry of Fuels.
Illingworth, Gerald	2nd	Inorganic Chemistry, Organic Chemistry, Physics, Chemistry of Fuels.

LONDON—EAST HAM TECHNICAL COLLEGE.

Gas Engineering—Ordinary Grade.

Gosling, Claude Ernest George	2nd	Inorganic Chemistry, Organic Chemistry, Technical Calculations and Drawing.
Pine, Winefred Edward	2nd	Inorganic Chemistry, Organic Chemistry, Technical Calculations and Drawing.
Williams, John Buckland	2nd	Inorganic Chemistry, Organic Chemistry, Technical Calculations and Drawing.

REGENT STREET POLYTECHNIC.

Gas Engineering—Ordinary Grade.

Rogers, Charles W. M.	1st	Chemistry of Gas Manufacture, Engineering Science.
Judd, Douglas A.	2nd	Chemistry, Physics, Engineering Science, Chemistry of Gas Manufacture.
Martin, Henry T.	2nd	Chemistry, Technical Chemistry, Engineering Science, Chemistry of Gas Manufacture.

Gas Engineering—Higher Grade.

Pyper, Frederick Gerrard	1st	Organic Chemistry, Engineering Science, Chemistry of Gas Manufacture.
Seabrook, John Anthony	1st	Organic Chemistry, Engineering Science, Chemistry of Gas Manufacture.
Tunstall, Richard Brian	1st	Chemistry of Gas Manufacture, Engineering Science.
Pepper, Richard John	2nd	Organic Chemistry, Engineering Science, Chemistry of Gas Manufacture.
Stephens, Edward Frederick	2nd	Organic Chemistry, Engineering Science, Chemistry of Gas Manufacture.

WESTMINSTER TECHNICAL INSTITUTE.

Gas Engineering—Ordinary Grade.

Pressley, Cecil Davies	2nd	Technical Maths., Engineering Science, Mechanics and Heat Engines.

Gas Supply—Ordinary Grade.

Randall, Lancelot F.	1st	Engineering Maths., Engineering Science, Technical Drawing.
Tucker, Horace J. R.	1st	Engineering Science, Technical Drawing.
Westbrook, William J.	1st	Engineering Science, Technical Drawing.
Graham, Frederick	2nd	Engineering Science, Gas Laboratory, Technical Drawing.
Willsmer, Ralph John	2nd	Engineering Maths., Gas Laboratory, Engineering Science, Engineering Drawing.

Gas Supply—Higher Grade.

LeFevre, Reginald N.	1st	Gas Laboratory, Building Drawing, Mechanics and Heat Engines.
Goldsmith, James H.	2nd	Gas Laboratory, Mechanics and Heat Engines.
Hazeldine, William A.	2nd	Gas Laboratory, Building Drawing, Mechanics and Heat Engines.
Mann, William J.	2nd	Technical Chemistry, Technical Maths., Technical Drawing, Gas Laboratory.

The following sat for examination in the single principal subject in order to qualify for the Diploma examination, the ancillary subjects being covered by the Diploma Course, with the results indicated:

Gas Engineering—Ordinary Grade.

Beretta, Joseph L.	2nd
Osborne, Charles G.	2nd

Gas Supply—Ordinary Grade.

Clarke, Neville V.	1st
Dawkins, Bernard	1st
Summerson, Roy	1st
Ibbett, Noel	2nd
Stonham, Bernard	2nd
Walker, Maurice	2nd

MANCHESTER COLLEGE OF TECHNOLOGY.

Gas Engineering—Ordinary Grade.

Name.	Class.	Ancillary Subjects Taken.
Clegg, Joseph	1st	Maths., Inorganic Chemistry, Organic Chemistry, Chemistry of Non-Metals, Chemistry of Metals, Physics.
Green, Douglas Kenyon	2nd	Inorganic Chemistry, Organic Chemistry, Chemistry of Metals.
Stothard, James Dunlop	2nd	Maths., Inorganic Chemistry, Organic Chemistry, Chemistry of Non-Metals, Chemistry of Metals, Physics.
Thompson, David McCallum	2nd	Maths., Inorganic Chemistry, Organic Chemistry, Chemistry of Non-Metals, Chemistry of Metals, Physics.

Gas Engineering—Higher Grade.

Name.	Class.	Ancillary Subjects Taken.
Smith, William Patterson	1st	Obtained a Second Class in 1926. Sat again this year with a view to securing a First Class.
Haslam, Geoffrey	2nd	Chemistry of Gas Manufacture.
Wilson, Samuel H.	2nd	Chemistry of Gas Manufacture, Gas Engineering Calculations, Mechanics, Building Construction.

SALFORD ROYAL TECHNICAL COLLEGE.

Gas Engineering—Ordinary Grade.

Sumner, Philip	2nd	Maths., Inorganic Chemistry, Organic Chemistry, Physics.

WELSBACH NEW SEASON PRODUCTIONS.

The lighting season will shortly be with us; and in anticipation of this, the Welsbach Light Company, Ltd., have shown much foresight in their early preparations for meeting the requirements of their customers. Visitors to the Company's showrooms at Welsbach House, Gray's Inn Road, W.C., will find an almost endless variety of lamps, burners, and glassware combining efficiency with artistic beauty, together with a selection of heating and cooking appliances.

From the numerous burners for indoor lighting for which the firm are noted a few may be selected for special mention.

The "Eddystone" burner is the leading type, fitted with all-magnesia nozzle; the highly polished hood being china lined. It is supplied in polished brass, steel or red bronzed, oxidized copper, and oxidized silver. The burner is fitted with the latest pattern gas adjuster and heavy brass mixing tube.

The "Tuskar" Cluster Burner, of polished aluminium, is made with a plain hood which diverts the products of combustion from the fitting. It has a superheater chamber taking three medium size mantles, and is very effective for shop, office, factory, or domestic lighting.

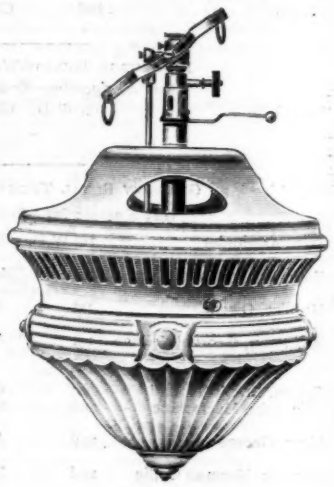
The "Corridor" burner has been specially designed for corridors and passages where a restricted light is required, and is a strong and handy burner for the purpose.

An illustration below shows the latest example of the Company's semi-indirect fitting. In this the gas connection from the ceiling rose is entirely concealed; the gas passing through one of the three ball jointed suspension rods to the burner. It will be noted that the band for carrying the bowl has been dispensed with.

The "Calshot" lamp for indoor lighting is a most attractive and efficient production in polished aluminium. It is fitted with superheater burner with three mantles. A notable feature of the lamp is its excellent diffusive properties.

The "Eddystone" Burner.

The "Tuskar" Burner.



Preheater Indoor Lamp.

The "Corridor."

New Semi-Indirect Fitting.

The "Welsbach" pre-heated indoor lamp for lighting shops, halls, &c., is of new and attractive design, being enclosed in Supastone bowl. It has white enamelled casing, and is fitted with three or five medium size burners arranged with preheater chamber.

Glassware in great variety forms a not inconsiderable display in the Company's showrooms. Innumerable new patterns of globes and bowls have been introduced this season embracing mottled effects, imitation alabaster, and hand painted (both external and internal), together with self-coloured varieties in rose, blue, and yellow.

In the heating section, the familiar Welsbach-Kern radiators form a very attractive range, and are all of robust construction.

Several new features have been introduced in the portable "Handi-heater." In the latest pattern the top has been strengthened to prevent buckling, and a metal platform is supplied for raising the stove off the ground. The heaters are fitted with the Welsbach-Kern burners with five or seven radiants, and are now made in aluminium or black sheet metal casing.

Wellingborough Gas Light Company, Ltd.—The Directors report that, for the half-year to June 30, the profit, after providing for interest and income-tax, amounts to £5332. This, added to the balance brought forward, makes an available balance of £8205. They recommend that dividends of 7½ p.ct. on the original and 6 p.ct. on the additional shares, less income-tax, be declared for the half-year. This will leave a balance of £4358 to be carried forward. The price of gas, which was raised on Oct. 1, owing to the abnormal conditions caused by the coal stoppage, has been reduced from July 1. The old scale of prices has been restored, with a modification in favour of large users of gas for power. The Directors have decided to extend their mains in order to supply gas to the village of Wilby; and they expect that this work will be completed early next year.

GAS REGULATION ACT APPLICATIONS.

SPECIAL ORDERS.

Northampton Gaslight Company.

To transfer to the Company the undertaking of the Weedon Gas Light, Coke, and Coal Company, Ltd.; and to empower the Company to raise additional capital.

Oldbury Urban District Council.

To define and extend the limits of supply; to enable the Council to purchase additional lands by agreement; to confer further powers upon them in regard to their gas undertaking; and to empower them to borrow further money.

Peterborough Gas Company.

To authorize the Company to purchase additional land; to enable them to issue new preference shares or stock; to increase the amount of money which they may borrow; and to make further provisions with reference to the Company's affairs.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

While there has not been much movement in the past week, the market might be described as quietly steady at recent levels. Inquiries for forward positions are of fairly satisfactory volume, and, even if they are not at present leading to much definite business, they encourage the hope that export trade may definitely improve in the autumn. Sellers, at any rate, are not anxious to contract ahead at current prices. The demand for prompt coals remains slack, and many collieries are living a hand-to-mouth existence, with the constant risk of idle days.

Coking coal is still a very weak market, and is causing considerable anxiety to producers and holders. Gas and bunker coal, on the other hand, showed a rather improving tendency on the week.

Wear Special gas makes quote 16s. to 16s. 6d. f.o.b., and best qualities 16s. to 16s. 3d. Seconds and others are 13s. 9d. to 14s. 6d. Durham unscreened coking is 13s. 6d. to 14s., large quantities being obtainable at the lower figure. Durham bunkers are 14s. 6d. to 15s. 6d. for best makes, according to place of shipment, other qualities being 13s. 9d. to 14s. Northumberland steams are quiet at 14s. 3d. to 14s. 6d. for best screened makes. Gas coke is in quite good demand, and 21s. f.o.b. is the price quoted for shipment.

YORKSHIRE AND LANCASHIRE.

The majority of gas contracts have now been concluded at prices favourable to the buyers; and it is anticipated that supplies in this direction will flow more freely during September.

House coal is moving steadily considering the period of the year and the local holidays, though the unseasonable weather has helped trade greatly.

There is no improvement on the industrial side, and there appears to be a general lack of confidence in the future, or advantage would no doubt be taken to accumulate stocks of cheap steam-raising fuel of all grades, much of which is being produced at a considerable loss.

The export market continues to cause grave anxiety, and those mostly interested appear unable to find a reason why the extremely low prices put before foreign buyers do not result in business. The question is an international one, and this country is likely to feel the effects of last year's coal stoppage for many years to come.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 16s. 10½d. to 17s. 1½d.; screened gas coal, 15s. 6d. to 16s.; washed trebles, 16s. 9d. to 17s. 9d.; washed doubles, 16s. 6d. to 16s. 9d.; washed singles, 15s. 6d. to 15s. 9d.; washed smalls, 12s. to 12s. 3d.; rough slack, 10s. to 10s. 3d.; smithy peas, 17s. 3d. to 18s. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 15s. to 15s. 6d.; screened gas coal, 15s. to 15s. 9d.; washed trebles, 16s. to 17s.; washed doubles, 15s. 3d. to 15s. 6d.; washed singles, 15s. to 15s. 3d.; washed smalls, 11s. 9d. to 12s.; unwashed trebles, 15s. to 15s. 6d.; unwashed doubles, 13s.; coking smalls, 10s. 9d. to 11s. per ton. Derbyshire and Nottinghamshire—Top hards, 17s. 6d. to 19s.; washed doubles, 16s. 3d. to 16s. 9d.; washed singles, 15s. 6d. to 15s. 9d.; washed smalls, 11s. 9d. to 12s. 3d.; rough slack, 10s. 3d. to 10s. 9d. per ton. Yorkshire, Derbyshire, and Nottinghamshire—screened steam coal, 14s. 6d. to 15s.; gas coke, 19s. to 21s.; furnace coke, 19s. to 19s. 6d. per ton.

Average quotations at Manchester: Lancashire best house coal, 30s. to 32s.; seconds, 29s. to 30s.; common, 19s. to 21s.; kitchen, 22s. to 24s.; Yorkshire Haigh Moor house, 30s. to 32s.; house coal, 18s. to 30s.; cobbles, 19s. to 21s.; washed doubles, 13s. to 15s.; washed singles, 12s. to 14s.; rough slack, 9s. to 10s. per ton into wagons at pit.

MIDLANDS.

The gas undertakings are so heavily stocked that it is extremely difficult to effect new business. A Derbyshire colliery which had a surplus of gas coal to dispose of eventually offered to accept 8s. 6d. Even then there was no rush to secure the bargain.

There has been no measurable improvement in the house coal or the industrial trade. The irregular conditions incident to the holiday season has left a superabundance of slacks. Prices have fallen as low as 7s. at Birmingham, and in some neighbouring districts 5s. 6d. has been taken by overloaded collieries. D.S. nuts have been plantiful; prices ranging from 12s. up to 15s. for best grades. Hand-picked house coals of highest quality command 36s.; but there is no stringency.

Blast-furnace coke is selling at 12s. 6d. to 13s. 6d. Ovenmen are not disposed to make contracts on those terms, however, as the advance of the season is strengthening their position. All the output is now being absorbed.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

Aug. 22.

There is little change to record in the London tar products market, and prices generally remain the same as last reported—viz.:

Pitch, about 92s. 6d. per ton. Creosote, 8⅝d. to 8¾d. per gallon. Pure toluole, 2s. per gallon. Pure benzole, about 1s. 6d. per gallon. Solvent naphtha, 95/160, nominal at 1s. 4d. to 1s. 5d. per gallon. Pyridine, about 6s. per gallon.

Tar Products in the Provinces.

Aug. 23.

Markets for tar products remain firm, and there still appears to be a shortage of most articles.

Pitch is very steady indeed; 92s. 6d. is reported to have been paid for delivery this year, and 90s. for January/March next year.

Creosote is very firm, and stocks are being cleared as fast as produced.

Water-white products are quiet, in sympathy with the further reduction in petrol.

Naphthalene prices remain steady.

Tar acids are firm, and rather high prices have been paid for special grade cresylic to the end of the year.

The average prices of gas-works products during the week were: Gas-works tar, 64s. 6d. to 69s. 6d. Pitch—East Coast, 90s. to 92s. 6d. f.o.b. West Coast—Manchester, 85s. to 87s. 6d.; Liverpool, 87s. 6d. to 90s.; Clyde, 89s. to 91s. 6d. Benzole, 90 p.ct., North, 1s. 2d. to 1s. 3d.; crude, 65 p.ct. at 120° C., 10¼d. to 10½d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 3d. to 1s. 4d. Toluole, naked, North, 1s. 4d. to 1s. 5d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 10½d. to 11½d. Heavy naphtha, North, 1s. to 1s. 1d. Creosote, in bulk, North, liquid, 7¼d. to 7½d.; salty, 7d. to 7¼d.; Scotland, 7¼d. to 7½d. Heavy oils, in bulk, North, 8¾d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 4½d. to 2s. 5d. prompt. Naphthalene, £11 to £14; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Manchester Tar Prices.

Readers who are interested in these should note the announcement in a paragraph following the Editorial Articles in this week's issue.

TRADE NOTES.

Small Brass Gasfittings.

Messrs. Falk, Stadelmann & Co., Ltd., of Veritas House, Farringdon Road, E.C. 1, have published a new sectional list devoted to small brass gasfittings.

CONTRACTS OPEN.

Ammoniacal Liquor.

The Spenborough Urban District Council are inviting tenders for the purchase of ammoniacal liquor produced at their two gas-works. [See advert. on p. 460.]

Coal.

The Bakewell Urban District Council are inviting tenders for the supply of gas coal. [See advert. on p. 460.]

Tenders are invited by the Bingley Urban District Council for the supply of gas coal. [See advert. on p. 460.]

Tenders are invited by the Clacton Urban District Council for the supply of gas coal. [See advert. on p. 460.]

The Directors of the Wrexham Gas Company are inviting tenders for the supply of coal. [See advert. on p. 460.]

Lamp Columns.

The Tipton Gas Department are inviting tenders for the supply of lamp columns. [See advert. on p. 460.]

Stores (Lime and Soda Ash, Ironmongery, Glass, Oils, Creosote, &c.).

Tenders for the above general stores are invited by the Tipton Gas Department. [See advert. on p. 460.]

Holbeach Gas Company.—At the last meeting of the shareholders a loss of £134 was reported on the year's operations, and therefore no dividend was declared.

Reduction in Price of Benzole Mixture.—The present prices for "benzole mixture" and "National benzole mixture" are as follows: In the Metropolitan Police Area and Outer London zone, *ex* pump, 1s. 2½d.; rest of England and Wales, 1s. 3½d.; Scotland, 1s. 4½d.; Ireland, 1s. 5½d. National benzole in cans: 2s. 0½d. throughout England and Wales; 2s. 1½d. in Scotland.

Satisfactory Year at Peterborough.—A satisfactory report was presented at the recent half-yearly meeting of the Peterborough Gas Company, held under the presidency of Mr. A. J. Paten. The balance on the profit and loss account, after providing for interest on the mortgage and on debenture stock, and allowing £2000 for the depreciation of meters, &c., was £21,501. Out of this the statutory dividend of 5 p.ct. per annum was declared on the new preference "A" shares, and 7 p.ct. on the old ordinary stock. The payment of these dividends would absorb £3303, leaving a balance of £18,198, which it was recommended should be carried over, as a considerable portion of the money would be required for renewing the gasholder and retort bench, contracts for carrying out which have already been entered into. A reduction of a penny per therm had previously been made in the price of gas, and it was decided to make a further similar reduction forthwith, equal to 5d. per 1000 c.ft. The report was adopted.

A Satisfactory Year at Hereford.

In proposing the adoption of the report of the Gas Committee at a recent meeting of the Hereford City Council, Alderman Witts, Chairman of the Committee, reviewed the position of the undertaking. He said that on the expenditure side of the accounts coal had cost £6100 more than in the preceding year, maintenance and works £288 more, and rates and taxes £754 more. Generally, the total extra cost was something over £8000, including the cost of coal. The total expenditure had been £51,984, against an income of £58,316, leaving a balance over expenditure of £6332. Out of that sum interest was payable to the amount of £1640, leaving a balance of £4791 to go to revenue, to which £930 was to be added as special sinking fund from the prepayment meters account, making revenue account £5730. Out of this a sum of £4228 had to be paid out in respect of loans, leaving a net balance of £1502 to place to revenue account. During the year they had reduced the amount of unaccounted-for gas by 1,363,000 c.ft. He had already announced that the price of gas would be reduced by 6d. per 1000 c.ft. as from March 1 last. Continuing, Alderman Witts said that the Committee were getting near the limit of output possible with the present plant. Last year they sold 6 million c.ft. more than in the preceding year, and since 1920 the consumption had gone up by 46 millions. Much of the present plant had been working for fifty years, and was becoming expensive in use. Something would have to be done in the course of the next twelve months. A recommendation to borrow £2300 for prepayment installations and £2500 for extensions to mains and services was approved, and the report of the Committee was adopted.

Barry's Small Loss.—Presiding at a recent meeting of the Barry District Council, Mr. C. B. Griffiths, the Chairman, said that during the coal stoppage the Gas Committee had sufficient courage not to increase the price of gas to the consumer. The result of the year's work was the small loss of £715.

Reduction at Windermere.—The Directors of the Windermere District Gas and Water Company announce that the price of gas supplied to all consumers will be reduced by 3d. per 1000 c.ft., making the new price 5s. 3d. per 1000 c.ft. This reduction will come into force after the reading of the meters for the quarter ending Sept. 29.

Gas Prices at Malton and Barnard Castle.—At the half-yearly meeting of the Malton Gas Company, it was announced that the price of gas would be reduced at the end of the current quarter to 8½d. per therm (3s. 6d. per 1000 c.ft.). The Barnard Castle Gas Company are reducing the price by 9d. per 1000 c.ft., as from July 1.

Wigton Gaslight and Coke Company, Ltd.—The annual meeting was held recently; Mr. Robert Lawson, Chairman of the Directors, presiding. The Directors in their report expressed regret at the death of one of their colleagues, Mr. Joseph Brown, who took an active interest in the management of the Company's affairs. The revenue for the year amounted to £7789 (including £250 depreciation of plant, &c.), and the expenditure to £7294, leaving a net profit of £495 for the year. This, with £1901 brought forward, made a total of £2396 available for division. The Directors recommended payment of a dividend of 12s. per share, free of income-tax, which, with the interim dividend of 5s. per share already paid, would absorb £637, and leave £1759 to carry forward. A reduction of 10d. in the price of gas, bringing it to the pre-strike price of 5s. per 1000 c.ft., has been decided upon as from July 1.

Working of the Kendal Gas Department.—In his report on the working of the Kendal Gas and Water Department for the year ended March 31, Mr. W. R. Wilson, the Engineer and Manager, states that the gross profit on the Gas Department amounts to £3953, to which must be added £239, interest on reserve fund investments, &c. After setting aside £4661 for interest and sinking fund charges, and £795 income-tax and bank interest, the net loss amounts to £1264. This amount, together with £1114 for special renewals, has been balanced by taking £237 from net revenue appropriation account and £2141 from the reserve fund, which now stands at £2858. The sinking fund, including debt repaid, stands at £40,294. The total quantity of gas made was 119,051,500 c.ft.—an increase of 679,500 c.ft. or 0·57 p.ct. The price of gas was raised from 4s. to 4s. 6d. per 1000 c.ft., as from Oct. 1, to meet the additional expense due to the coal strike; but the Committee hope shortly to revert to the pre-stoppage price. A showroom was opened on Feb. 3 for the convenience of the public; and since it was inaugurated, orders have been booked for 85 cookers, 35 fires, 25 boilers, and 2 geysers.

Harpenden District Gas Company.—The annual meeting of the Harpenden District Gas Company was held on Aug. 10. The Secretary (Mr. E. H. Martin) read the notice convening the meeting. The Chairman (Mr. T. H. Martin), in presenting the Directors' report and statement of accounts for the year ended June 30 last, mentioned that the expenditure in revenue account was considerably more than during the previous year, owing to the greatly enhanced cost of foreign coal purchased during the coal stoppage, and also because the cost of repair and maintenance of works had been greater. On the other side of the accounts, however, there had been an increase in the sale of gas of over 6 p.ct., and an additional amount was received for residual products. The balance carried to profit and loss account almost corresponded with that of last year, which enabled the Company to pay a dividend of £7 8s. p.ct. on the ordinary stock (6 p.ct. standard), less income-tax, subject to the interim dividend already paid, being at the same rate as the year before. There had been further extensions of mains, and they had connected-up 158 new consumers during the twelve months. In consequence of the coal stoppage, the price of gas was raised 1d. per therm from Michaelmas, 1926, and a further 1d. per therm for the first quarter only of 1927. The Company, however, gave an uninterrupted supply of gas throughout the strike. The Chairman announced a reduction of ½d. per therm as from the reading of the meters at Michaelmas next.

Newquay's Capital Issue.—A new issue of capital is being made by the Newquay (Cornwall) Gas Company, Ltd., for the purpose of providing additional plant rendered necessary by the increasing demand for gas. The new shares will be of £1 denomination, and entitled to a dividend of 7 p.ct.

Morpeth Gas Light Company (1902), Ltd.—In their report on the working of the Company for the year ended June 30, the Directors state that the gross profit for the year amounted to £3014. They recommend the payment of a dividend of 6 p.ct., less income-tax, for the year on the preference shares, and 7 p.ct., free of tax, for the year on the ordinary shares, and the carrying-forward of £1469.

Whitworth Vale Gas Company.—The revenue account of the Company for the half-year ended June 30 shows a profit of £1783, which, with the amount brought forward after carrying £1000 to the reserve fund, leaves a disposable balance of £729, out of which the Directors recommend a dividend of 7 p.ct. per annum on the original shares and 5 p.ct. per annum on the "B" shares, less income-tax.

Results at Hebden Bridge.—Members of the Urban District Councils of Hebden Bridge and Mytholmroyd—the two bodies which jointly appoint the Hebden Bridge and Mytholmroyd Gas Board—met recently to hear the financial statement of the Board for the past year. The statement showed a net loss of £1440, which is less than the loss of the previous year, and is accounted for by the 1926 coal strike difficulties. There was a record output of gas—125,385,000 c.ft.

Winchester Water and Gas Company.—The report of the Directors for the half-year ended June 30 shows that the balance of net revenue available for dividend, after transferring £250 to the reserve fund account, is £8666; and the Directors recommend the payment, on Sept. 1 next, of a dividend on the preference stocks at the rate of 4 p.ct. and 5¼ p.ct. per annum respectively, less income-tax, and on the consolidated ordinary stock at the rate of 5 p.ct. per annum, less income-tax, for the half-year. The sale of gas during the half-year has increased by 4 million c.ft., or 5 p.ct., over the corresponding half-year of 1926. Included therein is an increase in consumption of 529,000 c.ft. at Allbrook. The price of gas was reduced by 1d. per therm (or 4½d. per 1000 c.ft.) on March 1 last; and the Directors now announce a further reduction of 1d. per therm as from the Michaelmas meter reading, reducing the charge to 1s. per therm, or 4s. 6d. per 1000 c.ft.

Cooking Equipment of New Houses at Tavistock.—There was some warmth in a discussion which took place at the August meeting of the Tavistock Urban Council in reference to the provision of grates and cookers in the houses which the Council is building. A letter was read from the architect, stating that it was being arranged for a coal grate to be installed in the living rooms and a gas cooker in the sculleries. One of the members declared there was a definite promise when the housing scheme was introduced that there should be alternative provision for gas or coal cooking. There had been many deviations, however, from the scheme; and if the houses had been built without provision for coal cooking, the terms had been altered without the knowledge of the Council. He understood further that the contractor, with the knowledge of the architect, was bound under a sub-contract to the Gas Company to buy the cookers from them. If that was being done behind the Council's back, considering certain members of the Council were interested in the Gas Company, it was not as square and straight as it ought to be. The member contended that instead of the architect's tiled coal grates in houses of that kind, it would have been better to have grates which could be used for cooking or heating as desired. The allegation in regard to the grates and gas cookers was strongly denied by Mr. C. Stapleton, who said he was connected with the Gas Company. The Council had nothing to do with the Gas Company in regard to grates, which was a matter between the Company and the tenants; and the Company had no contract with any builder for the supply of grates to the houses. Eventually a proposition was passed that twelve of the houses should be provided for cooking by gas, and twelve for cooking by coal.

The ratepayers of Eckington have decided to spend £290 on the lighting of the parish by gas for the current year.

The Rugeley Urban Council have accepted the tender of the Rugeley Gas Company of 70s. per ordinary lamp, and 85s. for three-burner lamps, during the winter season.

A minor explosion which occurred on Aug. 18 in the water gas plant at the Canons' Marsh Gas-Works resulted in slight injuries to two operators—Henry Hillbourne and Alfred Weston.

A tank of oil became ignited at the Wolverhampton Gas-Works on Aug. 11, and the Fire Brigade was promptly summoned as a precaution. The outbreak, however, was put out by the staff before the Brigade arrived, and there was no damage apart from the loss of the oil itself.

The Matlock Urban Council have approved of a new arrangement between the Matlock Bath Gas-Works Committee and the English Sewing Cotton Company, which provides that the charges for gas for the current year be the same as under the old agreement—viz., 30 p.ct. less than to ordinary consumers.

At the Shrewsbury Police Court, William Henry Davies was charged with stealing 9s. 7d., the money of the Shrewsbury Gas Light Company, from a gas meter at his house, and also with damaging the padlock of the meter. Defendant pleaded guilty, and was sentenced to six weeks' imprisonment with hard labour.

Whether gas or electricity is more suitable for Council houses in a rural district was discussed by the Town Council of Tiverton last week; the Housing Committee's recommendation to instal gas being adopted for the Cullompton site scheme in face of an amendment favouring electricity, which was desired by the Parish Council concerned.

STOCK MARKET REPORT.

BUSINESS on the Stock Exchange last week was on a much reduced scale. Tight money conditions accentuated the position and imparted a downward tendency to the gilt-edged section. Australian and New Zealand scrips were the exception, and several rises were recorded. Otherwise the account came to a very quiet conclusion; and while arrangements for this week's settlement occupied some attention, markets were idle and uninteresting.

In the Foreign Market the few movements were of minor importance, Chinese loans alone showing any improvement. Home Rails, with traffic receipts below those for 1925, were naturally ignored.

There was some demand for the popular industrials, and Iron and Steel descriptions were a little more prominent, influenced possibly by the Dorman Long preference announcement. On the other hand, Oil shares drooped on the reduction in the price of petrol.

There is little to record in the Gas Market. The demand for stocks continued; but buyers again exceeded the sellers. Most of the interim dividend announcements have now been made, and there are hopeful anticipations for the current half-year. Companies report increased sales, which are probably assisted by the inclement weather. With the exception of a 3d. reduction in Primitiva shares and a rise of 6d. in Colonial Gas shares, there were no changes in the quotations on the London Exchange. Chester was marked up 1½, Newcastle Consolidated ½, and Tynemouth 1 at the local exchanges.

The following transactions were recorded during the week:

On Monday, Bombay 21s. 1½d., 22s., Brighton 5 p.ct. 94½, Colonial 25s. 3d., 25s. 6d., Commercial 87¼, 88, European 6½, Gas Light and Coke 86½, 86⅜, 86½, 87, Hastings 3½ p.ct. 69, 70, Montevideo 91, Primitiva 16s. 9d., 16s. 10½d., South Metropolitan 101, Wandsworth "B" 101, 3 p.ct. debenture 52½. Supplementary prices, Folkestone 75, Southgate additional 100½.

On Tuesday, Alliance and Dublin 85, 85½, British 4 p.ct. debenture 76½, Commercial 87, 87½, 3 p.ct. debenture 57, Continental Union 7 p.ct. preference 86, European 6⅝, 6⅞, Gas Light and Coke 86½, 86⅜, 86⅞, 4 p.ct. preference 75½, 76¼, Imperial Continental 139½, 141, Primitiva 16s. 9d., 17s. 1½d., South Metropolitan 101½, 101¾, 102, 6 p.ct. preference 109½, 109½, 6½ p.ct. debenture 103¾, Tottenham "B" 91. Supplementary prices, Hornsey 5 p.ct. preference 84, Torquay 5 p.ct. preference 87, 87½, Tottenham 5 p.ct. preference 85.

On Wednesday, Bombay 22s., Gas Light and Coke 86⅜, 86½, 86⅝, 86⅞, 87, 4 p.ct. preference 75½, 3 p.ct. debenture 58¾, 5 p.ct. debenture 99⅝, Imperial Continental 139, Primitiva 16s. 10½d., 17s. 1½d., South Metropolitan 6 p.ct. preference 109½, South Suburban 5 p.ct. 103½, 104, Tottenham "B" 91, 91½, 92, 4 p.ct. debenture 72½, Wandsworth "B" 103. Supplementary prices, Guildford 98½, Hornsey 5 p.ct. preference 86½, Torquay 5 p.ct. preference 87, 87½.

On Thursday, Commercial 87¾, Continental Union 7 p.ct. preference 86, Croydon 97½, maximum dividend 78, European £6 4s., 6½, 6 15/16, 6⅞, Gas Light and Coke 86⅝, 86½, 86⅞, 4 p.ct. preference 75½, 76, Imperial Continental 139½, 141, Primitiva 16s. 6d., 16s. 7½d., 16s. 9d., South Metropolitan 101½, South Suburban 5 p.ct. 103½, Tottenham "B" 91.

On Friday, Alliance and Dublin 84¾, 85¼, Gas Light and Coke 86¼, 86⅜, 86½, 86⅞, 87, 3 p.ct. debenture 59½, 5 p.ct. debenture 99⅞, Imperial Continental 139, 141, Primitiva 16s. 7½d., 16s. 9d., South Metropolitan 101⅜, 102 5/16, South Suburban 5 p.ct. 102½. Supplementary prices, Torquay and Paignton 5 p.ct. preference 87½.

As is usual, there were abundant supplies of loanable credit at the close of the week. Fresh advances were obtainable at from 3½ down to 3 p.ct. The higher rate at which Treasury Bills were allotted—£4 7s. 10·68d. p.ct.—imparted firmness to the discount market; but business was on a small scale.

On the Foreign Exchange Market the dollar-sterling was firmer at 4.86 5/32; Italian lire were easier, the Milan rate being 89.25; German marks declined to 20.42½; pesetas finished higher at 28.81; and French francs remained at 124.

Silver was easier, the price declining to 25½d. per oz., and Gold was quoted higher at 84s. 11d. per oz.

The Bank Rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. The banks' deposit rate is 2½ p.ct., and the deposit rates of the discount houses are 2½ p.ct. at call and 2⅞ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 19.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 10	5	5	Aldershot 5 p.c. max. C.	70—73	..	
229,992	"	"	4	4	Do. 4 p.c. Pref.	68—71	..	..
1,551,868	"	Apl. 7	6½	7	Alliance & Dublin Ord.	84—87	..	..
274,000	"	July 14	4	4	Do. 4 p.c. Deb.	54—57	..	84⅜—85⅛
532,654	"	—	—	—	Barnet Ord. 7 p.c.	101—104	..	..
800,000	1	Apl. 28	1/7½	1/7½	Bombay, Ltd.	1—1½	..	..
170,000	10	Mar. 10	8½	8½	Bournemouth 5 p.c.	122—132	..	21/11½—22/-
800,000	10	"	7	7	Do. B 7 p.c.	124—132	..	..
275,000	10	"	7	7	Do. Pref. 6 p.c.	11—11½	..	..
50,000	Stk.	June 29	6	6	Do. 3 p.c. Deb.	54—57	..	..
162,025	"	"	3	3	Do. 4 p.c. Deb.	74—77	..	..
357,900	"	"	4	4	Brighton & Hove 6 p.c. Con.	106—109	..	..
311,800	"	—	—	—	Do. 5 p.c. Con.	94—97	..	..
1,287,500	"	July 28	5	5	Bristol 5 p.c. max.	88½—84½a	..	..
855,000	"	Mar. 24	8	8	British Ord.	108—111	..	94½
100,000	"	June 29	7	7	Do. 7 p.c. Pref.	112—117	..	..
130,000	"	"	4	4	Do. 4 p.c. Red. Deb.	73—78	..	..
200,000	"	"	—	33/2	Do. 5 p.c. Red. Deb.	94—96	..	76½
100,000	10	May 26	6	6	Cape Town, Ltd.	74—8½	..	..
100,000	10	Apl. 28	4½	8	Do. 4½ p.c. Pref.	6—7	..	..
180,000	Stk.	June 29	4½	4½	Do. 4½ p.c. Deb.	70—75	..	..
696,850	"	July 28	4½	4½	Cardiff Con. Ord.	97—100	..	..
187,880	"	June 29	6	6	Do. 7½ p.c. Red. Deb.	99—103	..	..
157,150	"	Aug. 11	7½	7½	Chester 5 p.c. Ord.	86—91b	..	..
79,186	1	Apl. 28	6½	5	Colombo Ltd. Ord.	29/—31/-	+1½	90
24,495	1	"	1/2/-	1/2/-	Do. 7 p.c. Pref.	20/—22/-	..	..
331,490	1	Apl. 7	1/4½	1/4½	Colonial Gas Assn. Ld. Ord.	25/—27/-	..	..
173,900	1	"	1/9½	1/9½	Do. 8 p.c. Pref.	20/—22/-	+/6	25/3—25/6
2,073,280	Stk.	July 14	1/7½	1/7½	Commercial Ord.	86½—88½	..	..
475,000	"	June 16	—	5	Do 8 p.c. Deb.	56—59	..	87—88
800,000	"	Sept. 30	8	8	Continental Union, Ltd.	34—37	..	57
300,000	"	Mar. 10	†9	11	Do. 7 p.c. Pref.	£4—86	..	..
787,660	"	Aug. 11	7	7	Croydon sliding scale	93—99*	..	86
493,100	"	"	6½	6½	Do. max. div.	77—80*	..	97½
492,370	"	"	5	5	Derby Con.	104—106e	..	78
56,000	"	Feb. 24	6	6	Do. Deb.	78—75e	..	..
309,000	"	June 29	4	4	East Hull Ord. 5 p.c.	76—80	..	..
80,000	"	Mar. 10	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
1,002,180	"	June 16	5	5	European, Ltd.	6½—6⅝	..	..
13,747,460	Stk.	Mar. 24	†3	†3	Gas Light & Coke 4 p.c. Ord.	85½—87½	..	£6/4/—6½
2,600,000	"	July 28	5	5	Do. 8½ p.c. max.	59—61	..	86½—87
4,157,020	"	"	3½	3½	Do. 4 p.c. Con. Pref.	74½—76½	..	..
5,502,620	"	"	4	4	Do. 3 p.c. Con. Deb.	58—60	..	75½—76½
181,315	"	June 16	3	3	Do. 6 p.c. Br'st'd Rd. Db.	100—103	..	58⅝—59½
1,642,770	"	"	6	6	Do. 5 p.c. Red. Deb.	98—100	..	..
49,000	"	"	5	5	Do. 7½ p.c. Ilford Deb.	..	..	99½
93,500	"	—	7½	7½	Hastings & St L. 5 p.c. Conv	90—92	..	..
368,740	"	Mar. 10	6½	6½	Do. 3½ p.c. Conv.	67—72	..	69—70
70,000	10	Apl. 28	5½	5½	Hongkong & China, Ltd.	12—13	..	..
178,200	Stk.	"	†10	†10	Hornsey Con. 3½ p.c.	67—69	..	..
1,976,000	"	Mar. 10	5	5	Imperial Continental Cap.	139—141	..	139—141
223,130	"	May 12	10	10	Do. 3½ p.c. Red. Deb.	68—70*	..	..
335,249	"	Aug. 11	3½	3½	Lea Bridge 5 p.c. Ord.	94—97*	..	..
2,145,907	"	Aug. 11	6½	6½	Liverpool 5 p.c. Ord.	92⅞—83⅞*	..	..
600,000	"	Aug. 11	5½	7	Do. 7 p.c. Red. Pref.	103—105b	..	..
165,736	"	Sept. 30	7	7	Maidstone 5 p.c. Cap.	110—115	..	..
63,480	"	Feb. 24	9	8	Do. 3 p.c. Deb.	50—55	..	..
75,000	"	June 16	3	3	Malta & Mediterranean	5—5½	..	..
541,920	Stk.	June 16	†7	†8	Montevideo, Ltd.	90—92	..	..
2,061,815	"	May 26	†5	†7	Newcastle & Gateshead Con	74—75d	+½	91
860,929	"	July 28	5	5	Do. 4 p.c. Pref.	66½—67½d	..	..
691,705	"	"	4	4	Do. 3½ p.c. Deb.	66½—67½d	..	..
131,786	"	June 29	3½	3½	North Middlesex 6 p.c. Con.	91—93	..	..
800,000	"	—	—	—	Oriental, Ltd.	100—102	..	..
188,120	"	Apl. 28	9	7	Plym'th & Ston'house 5 p.c.	102—107	..	..
414,500	"	June 21	7½	7½	Portsm'th Con. Stk. 4 p.c. Std.	102—105	..	..
286,792	"	Feb. 24	7½	7½	Do. 5 p.c. max.	76—79	..	..
2,289,969	"	"	5	5	Primitiva Ord.	16/6—17/6	—/3	16/6—17/1½
382,200	1	—	—	—	Do. 4 p.c. Red. Deb.	84—86	..	..
800,000	100	June 1	4	4	Do. 4 p.c. Red. Deb. 1911	71—73	..	..
434,968	Stk.	July 28	4	4	Do. 4 p.c. Cons. Deb.	71—73	..	..
150,000	"	June 29	—	4	San Paulo 6 p.c. Pref.	72½—73½	..	..
135,000	10	Mar. 24	6	6	Do. 5 p.c. Red. Deb.	46—49	..	..
270,000	50	June 29	5	5	Sheffield A	99—101e	..	..
419,968	Stk.	Mar. 24	5½	5½	Do. B	99—101e	..	..
1,047,000	"	"	5½	5½	Do. C	99—101e	..	..
90,000	"	"	5½	5½	South African	4—6	..	..
6,609,846	10	May 26	4	5	South Met. Ord.	101—103*	..	..
500,000	Stk.	Aug. 11	7	6	Do. 6 p.c. Irred. Pf.	109—112	..	..
1,895,445	"	—	—	—	Do. 3 p.c. Deb.	56—59	..	101—102 5/8
734,000	"	July 14	8	8	Do. 6½ p.c. Red. Db.	102—104	..	109½—109½
91,500	"	Mar. 10	6½	6½	South Shields Con.	101—103d*	..	..
1,243,796	"	Aug. 11	8½	8½	South Suburban Ord. 5 p.c.	102—105	..	108½
868,832	"	July 28	6½	6½	Do. 5 p.c. Deb.	92—95	..	..
647,740	"	June 16	5	5	South'mpton Ord. 5 p.c. max	74—77	..	102½—104
121,275	"	Mar. 24	5	5	Do. 4 p.c. Deb.	71—74	..	..
350,000	"	June 29	4	4	Swansea 7 p.c. Red. Pref.	100—102	..	..
200,000	"	Feb. 24	7	7	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	"	June 16	6½	7	Tottenham District A 5 p.c.	105—108	..	..
682,275	"	July 28	7½	6½	Do. B 3½ p.c.	89—92	..	..
150,000	"	"	6½	7½	Do. 5½ p.c. Pref.	95—98	..	91—92
161,255	"	"	6½	6½	Do. 4 p.c. Deb.	70—73	..	..
238,261	"	June 16	4	5½	Tynemouth Con. and New	73½—74½d	+1	72½
	"	Mar. 10	5	4	Uxbridge, Maidenhead, & Wycombe 5 p.c.	85—90	..	..
283,094					Do. 5 p.c. pref.	83—88	..	..
88,980	"	"	6½	6½	Wandsworth, Wimbledon, and Epsom—			
			5	5	Wandsworth A 5 p.c.	117—122	..	..
80,000	"	July 14	8½	8½	Do. B 3½ p.c.	100—105	..	..
355,696	"	"	7	7	Do. C and New	88—93	..	101—103
432,625	"	"	5/19/0	5/19/0	Wimbledon 5 p.c.	98—103	..	..
852,000	"	"	6½	6½	Epsom 5 p.c.	100—105	..	..
98,000	"	"	7½	7½	Do. 5 p.c. Pref.	83—88	..	..
200,000	"	"	5	5	Do. 3 p.c. Deb.	52—56	..	..
88,416	"	June 29	8	8	Do. 4 p.c. Deb.	73—76	..	52½
284,743	"	"	4	4				

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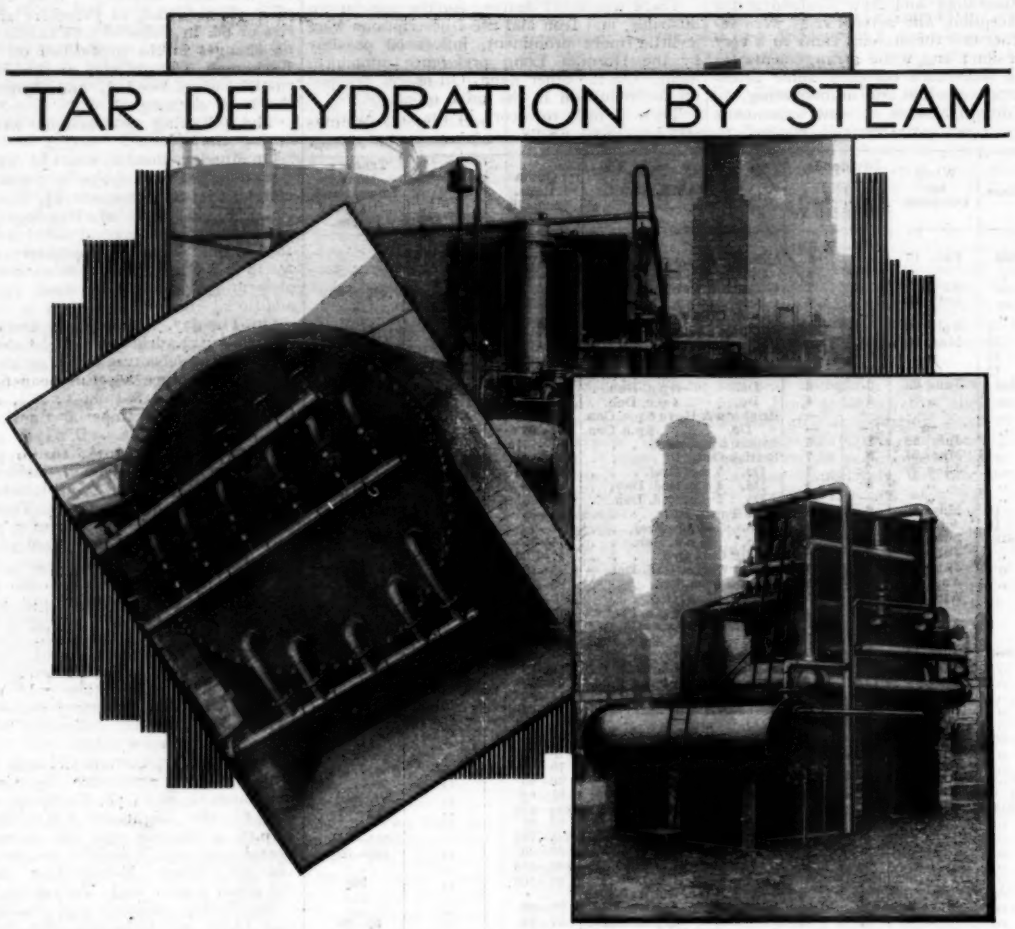

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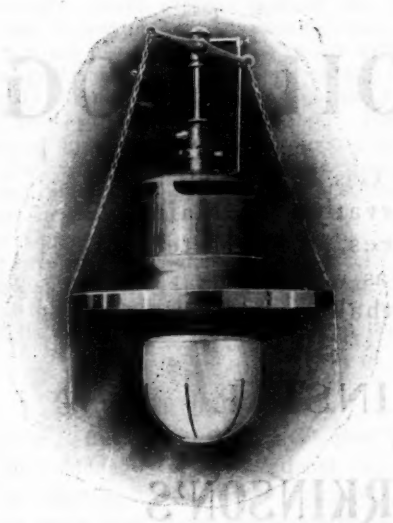

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